FEB 2

Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

JANUARY 26, 1948
VOLUME 37, No. 2

AMERICAN DYESTUFF REPORTER

GREENVILLE PUBLIC LIBRARY

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

Ponsol* Red Brown RB Paste
(Pat.)

PONSOL Red Brown RB Paste is an economical reddening element for shading a wide range of lightfast vat browns on cotton and rayon. Its good tinctorial strength makes it useful for producing chocolate shades. Possesses very good fastness to light, washing, and chlorine . . . good resistance to peroxide bleaching.

Can be applied to yarns, piece goods or rawstock in the usual dyeing equipment. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.

DU PONT
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BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Du Pont Dyestuffs

for

Uniform

dyeing of fine denier
ladies' nylon hosiery

NYDYE

EXCELLENT UNION

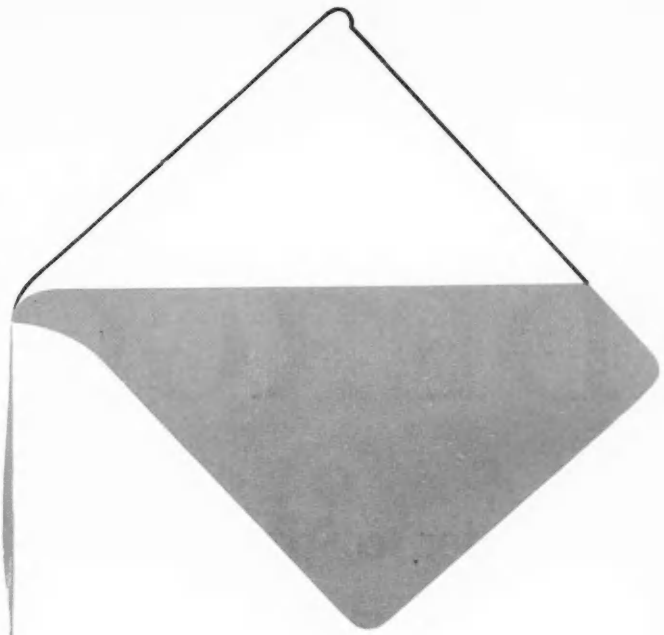
. . . unexcelled union dyeing properties between 15 denier boot and 30 or 40 denier welt.

In addition to giving you excellent union in dyeing, N Y D Y E colors are extremely fast to washing.

Chemical Company

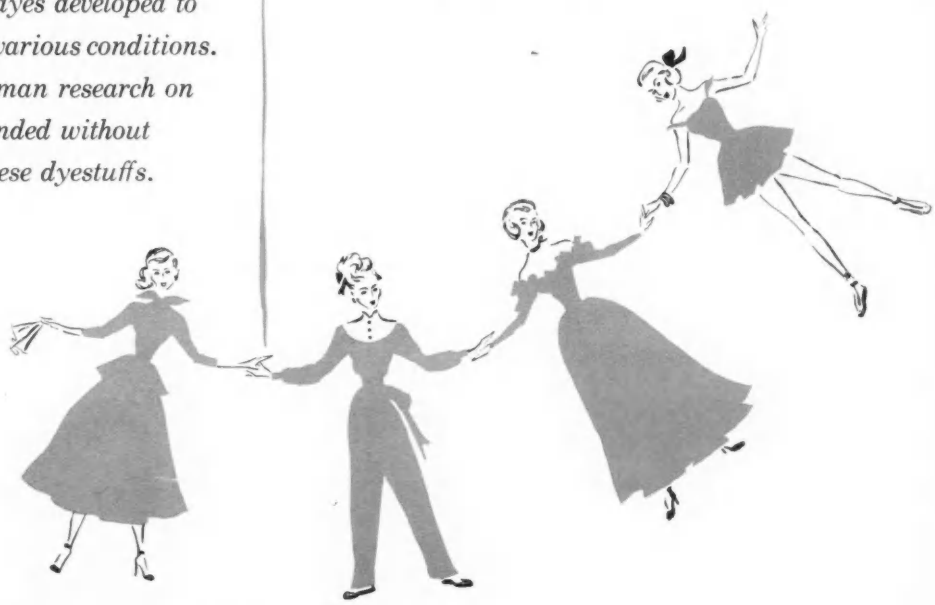
READING · PA.

Eastman Acetate Dyestuffs



Produced for synthetic fabrics, Eastman Acetate Dyestuffs are available in a variety of colors for practically every method of dyeing and printing. There are dyes well adapted to discharge or application printing. Other Eastman Acetate Dyestuffs can be used on both jig and box, at either high or low temperatures, with excellent build-up and leveling properties. Fabric dyers may take advantage of the special fastness properties of Eastman dyes developed to withstand fading under various conditions. The full benefit of Eastman research on dyeing problems is extended without obligation to users of these dyestuffs.

Eastman Acetate Dyestuffs are sold in the United States through Tennessee Eastman Corporation in Kingsport, Tennessee, and Lodi, N. J.; in Canada, through Clough Dyestuff Company, Ltd., 33 St. Mathieu Street, St. Laurent, Quebec.



Tennessee Eastman Corporation

—A SUBSIDIARY OF EASTMAN KODAK COMPANY

TO OVERCOME RISING COSTS:
REPLACE SOAP WITH
DERGON O M

(Reg. U. S. Pat. Off.)

for scouring all types of fabrics, woolens, cottons, rayons, and all knitted fabrics, including hosiery

DERGON O M IS A HIGHLY EFFICIENT DETERGENT AND A POWERFUL OIL EMULSIFIER

WRITE FOR INFORMATION OR DEMONSTRATION

ARKANSAS CO., INC.

NEWARK, NEW JERSEY

MANUFACTURERS OF INDUSTRIAL CHEMICALS FOR OVER 40 YEARS

American Dyestuff Reporter, Vol. 37, No. 2, January 26, 1948. Published every other Monday. Copyright, 1948, by Howes Publishing Co., Inc., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00; Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y. Post Office, under the act of March 3, 1879.

PERMA - PAR R

An improved cation action finish

RESISTANT TO WASHING & DRY CLEANING

REFINED PRODUCTS CORPORATION

Lyndhurst • New Jersey

• **Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent**

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

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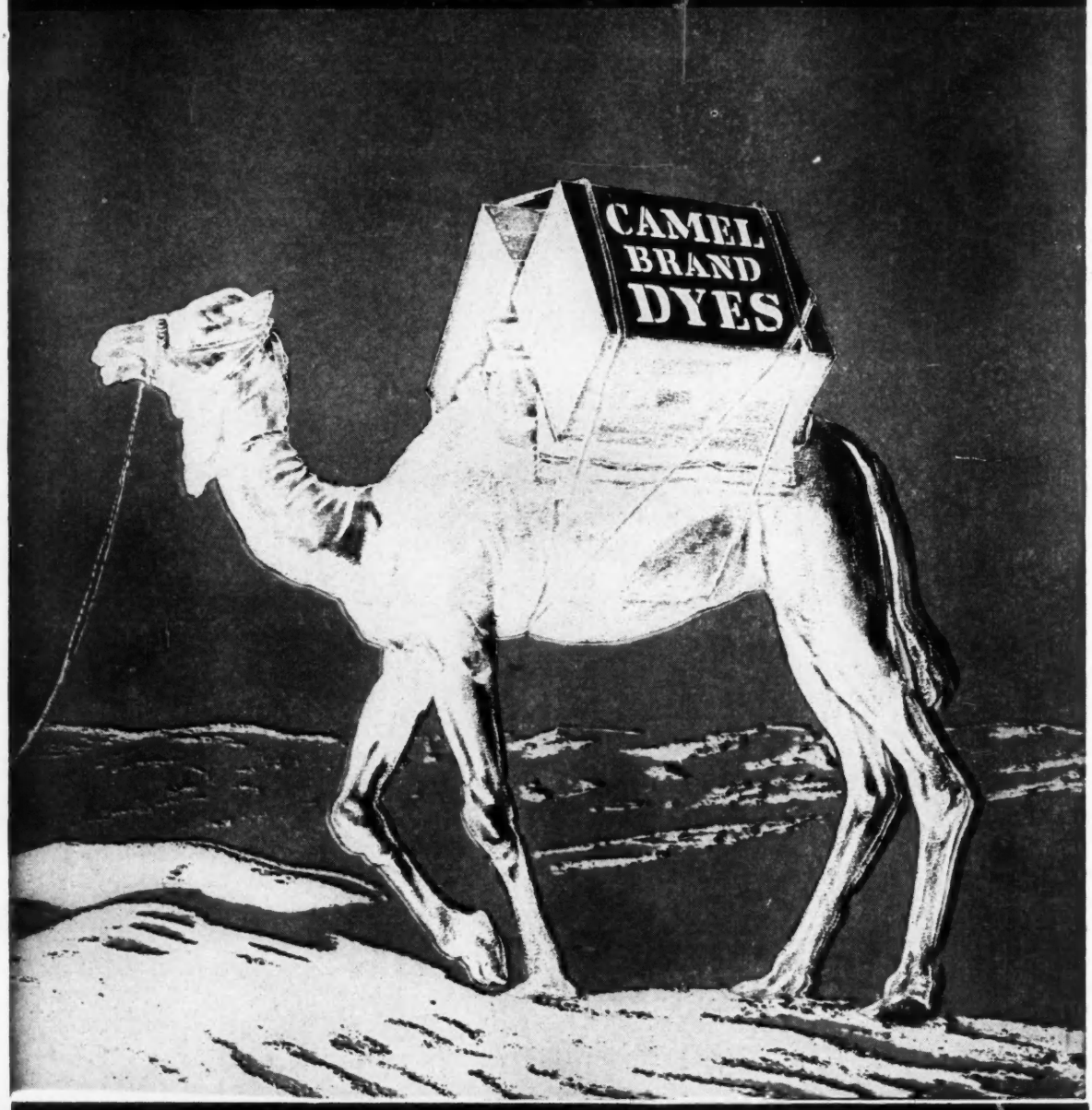
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Col Company, 82 Wall St., New York City.

QUALITY DYESTUFFS

SINCE 1878



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Use ATCOPEN 2-T

For
WETTING OUT and REWETTING
ON ALL TYPES OF FABRICS

A Thoroughly Versatile Penetrant in Many Processing Operations

- Wetting and rewetting operations.
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- All dyeing operations.
- Scouring and boiling off all types of fabrics.
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MAIN PLANT: CENTREDALE, RHODE ISLAND
BRANCH OFFICE: PATERSON, NEW JERSEY

Use ATCO Products

Ask for ATCOPEN 2-T Product Samples

It's What Hooker Sulfides Haven't Got that Make Them Important to You

COMPARATIVE freedom from heavy metal salts, the negligible amount of iron,—a maximum limit of 5 ppm in Hooker Sodium Sulfhydrate, and a maximum limit of 8 ppm in Hooker Sodium Sulfide—are reasons why these Hooker Chemicals are so popular among dye chemists.

This high purity, consistently maintained in every shipment, makes them especially desirable for use as reducing agents. These sulfides are employed with excellent results for selective reduction of one of several nitro groups in the same molecule. To eliminate the possible harmful effects of iron, Hooker Sulfides are extensively used in the preparation of aminophenol, many of the anthraquinone dyes, including acid, and nitro compounds such as acid Alizarin Blue SE, Developed Dyes, Rapidogen Dyes and Intermediates.

Another way that Hooker Sulfides are used is for the introduction of sulfur in dye manufacture. They also serve as solvents in the removal of excess sulfur from dyes produced by a sulfur fusion.

Because of their high purity, the need for settling, decanting and filtering is minimized and in many cases eliminated altogether, saving time and inconvenience.

Let Hooker Sulfides improve your products, save valuable time and lower your costs.

SODIUM SULFIDE, Na_2S, a light yellow colored solid in flake form, soluble in water, slightly soluble in alcohol, insoluble in ether.

Analysis

Sodium Sulfide	60 to 62%
Sodium Chloride	1.5% Max.
Sodium Salts	2.0% Max.
Iron	8 ppm Max.
All Other Metal Salts	1 ppm Max.
Water of crystallization	36.5 to 34.5%
Shipping Containers	Drums 90 and 350 lbs. net.

SODIUM SULFHYDRATE, NaSH, a light yellow colored solid in flake form. Soluble in water and alcohol, insoluble in ether.

Analysis

Sodium Sulfhydrate	70 to 72%
Sodium Hydroxide	0%
Sodium Sulfide	0.25 to 2.5%
Sodium Chloride	0.4 to 0.8%
Other Sodium Salts	0.04 to 0.4%
Iron	5 ppm Max.
All Other Metals	1 ppm Max.
Water of Crystallization	28 to 26%
Shipping Containers	Drums 90 and 350 lbs. net.

Hooker's Technical Staff is ready to work with you on the application of Hooker Chemicals to your processes. Technical Data Sheets and samples of Hooker Sulfides will be sent you when requested on your letterhead.

HOOKER CHEMICALS

8386

HOOKER ELECTROCHEMICAL COMPANY

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Chlorine
Caustic Soda
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A SINGLE MACHINE OR AN ENTIRE PLANT

Van Vlaanderen engineers are prepared to help you design a complete dyeing and finishing plant—or will help you select a single machine to meet a special need.

The Van Vlaanderen equipment you buy now will be better too—giving greater production and higher quality in processing modern fabrics.

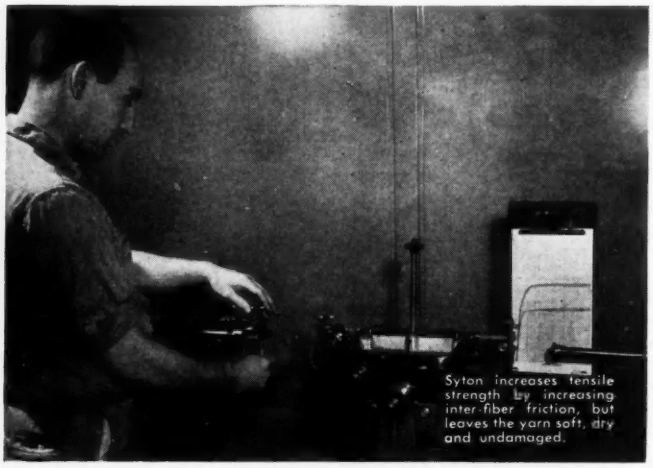
Discuss your requirements with us.

VAN VLAANDEREN MACHINE COMPANY

370 STRAIGHT STREET, PATERSON 3, NEW JERSEY

World's largest manufacturer of machines for processing modern fabrics

FOR YOUR INFORMATION



Syton increases tensile strength by increasing inter-fiber friction, but leaves the yarn soft, dry and undamaged.

SYTON W20: PROVED DAILY IN LEADING WORSTED SPINNING MILLS:

Syton* W20 is no 9-day laboratory wonder, but a proved textile chemical now accepted as standard by many leading worsted spinners.

Here are the various reasons they give for using Syton:

1. **Reduces twist without loss of strength**
2. **Reduces ends down on the spinning frame**
3. **Produces loftier yarn**
4. **Cuts spinning time and costs**
5. **Produces more uniform yarn**
6. **Reduces aging time after oiling**

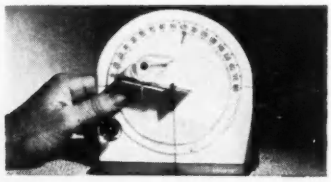
Syton W20 is Monsanto's especially developed dispersion in water of submicroscopic silica. When distributed evenly throughout the stock, Syton increases fiber "drag", and thereby permits better and more uniform draft control of the wool fibers during both drawing and spinning.

When Sytonized yarns are spun under standard conditions, without reducing twist, tensile strength increases are very evident. When Syton-treated yarns are spun at a lower twist than usual, the yarn strength is often 5 to 15% higher. In one mill, for example, when the twist was reduced 20%, the strength of the yarn was still greater than the untreated yarn at standard twist.

Even when Syton treated wool is spun to a finer count, higher breaking strengths have been observed. In one mill, the yarn was regularly spun to a 32's count, Syton-treated yarn was spun from the same stock to a 37's count, yet was 7½% stronger than the untreated.

Syton is simply added to the spinning emulsion at the gill box. No special equipment.

The handy coupon on the opposite page will bring you more information promptly. Just check Item A-1.



Measures Wrinkle-Resistance Accurately

A new, simple, accurate and practical method of measuring wrinkle recovery in fabrics has been developed in the textile research laboratories of Monsanto Chemical Company.

This device, called the Monsanto Wrinkle Recovery Meter, is now available to the trade so that wrinkle-resistance can be demonstrated quickly and accurately.

Previously, wrinkle-resistance was tested either by twisting the fabric and observing the results, or by the inverted V test. In this latter test, samples 4 cm. long were cut and creased, then hung over pins for five minutes. The distance between the outspread ends of the fabric was measured. The weight or softness of the fabric, produced inaccurate results.

The new meter, with similarly prepared samples, eliminates the effect of gravity and compensates for variabilities in construction. It measures accurately the degree of wrinkle-resistance by the actual angle of recovery directly at the crease.

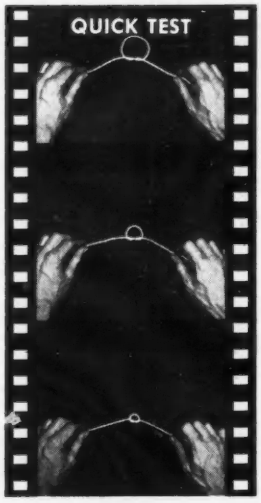
If you want a wrinkle recovery meter (at cost, approximately $15) or information about it, check Item A-3 on the attached coupon.

Synthetic Detergent

Monsanto's Sted* was formulated especially for wool scouring and other cleansing operations in the textile mill requiring a chemically mild, yet extremely powerful, detergent. A non-ionic, non-sudsing product, Sted holds soil in suspension rather than redepositing it on fiber. Check item A-4 for bulletins.

a report on Monsanto's Textile Developments January...1948

STYMER ENDS LONG HUNT FOR EFFICIENT ACETATE SIZE



First, **tie a loop in the yarn as shown in Figure 1.**

Second, start pulling the outer ends to draw the loop into an ever-decreasing circle.

Third, **note that on a Stymer-sized yarn, the film is so flexible that it does not crack until the circle reaches a very small diameter. Rigid films break, causing a distortion of the loop, at relatively large diameters.**

Stymer is a new synthetic sizing agent which is being used more and more extensively in acetate slashing.

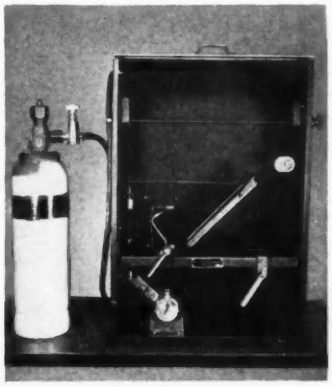
It forms a uniform tough film which gives the warp superior protection over a wide range of humidities and temperatures. The flexibility of the Stymer film can be shown by the simple and familiar "loop test" shown above; its over-all efficiency as a sizing agent has been demonstrated in weaving yarns of many different derniers.

Stymer is applied at normal slashing speeds from a 135-150°F. bath. The solution will not set up in mill pipes, will not gel when cold. Stymer slashed warps release moisture readily and can be dried quickly, without sticking on uncovered cans.

Since the Stymer film is an excellent conductor of electricity, no static eliminators are necessary.

The size can be removed easily from the woven fabric by a mild scour in warm water containing mild alkali and detergent. No enzymes or strong scouring agents are necessary.

For more complete information on Stymer for acetate slashing, check item A-2 on the coupon below.



American Hotel Association Reports on Rezgard

Monsanto's flame retardant textile chemical has received a high recommendation from the American Hotel Association's tests, run by the York Research Corporation, Stamford, Conn. The Association, anxious to get facts on flame retardant materials, found that Rezgard* in competition with other chemicals for this purpose, rated: "Excellent flame and glow-proofing agent. Rated A under tendering bake. One of the very low priced materials."

In the most important safety factor, afterglow, Rezgard showed an average of 0.5 seconds, maximum 1.0 seconds.

For a complete bulletin on Rezgard, check Item A-6 on the coupon.

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS — PLASTICS
SERVING INDUSTRY . . . WHICH SERVES MANKIND

USE THIS COUPON TO BRING YOU PROMPTLY FULL INFORMATION ON MONSANTO TEXTILE CHEMICALS

MONSANTO CHEMICAL COMPANY
Textile Chemicals Dept.
140 Federal Street
Boston 10, Mass.

Please send me the following material A-1 A-2 A-3
A-4 A-5 A-6 (Circle item on which information desired)

Name.....

Company..... Title.....

Address.....

City..... State.....

Eliminate THE EXTRA STEP

Cut MIXING COSTS 30% or more

One way to reduce material handling costs is to eliminate the extra step of emptying drums into mixing units.

Wherever mixing can be performed by revolving or tumbling the container, "U. S." Drum Mixing equipment can save you time and money.

"U. S." Drum Mixing equipment permits mixing in your own or supplier's drums . . . avoids the costly delays from emptying and cleaning fixed containers . . . eliminates danger of contamination.

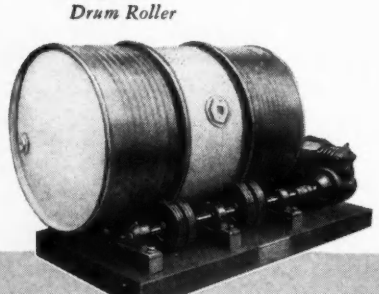
AVAILABLE *for Quick Shipment*

While our present supply of highly scarce motors lasts, we can make prompt shipment of certain size units. Write or wire for details.

DRUM ROLLERS

"U. S." Adjustable Drum Rollers will roll any round container from a one-gallon pail to a 70-gallon drum. Eight heavy-duty rubber wheels are adjustable to provide ample clearance for rolling hoops and bung openings. Powerful, heavy-duty motor will roll loads up to 1,000 lbs. "U. S." Drum Rollers are built in sizes to handle one, two, three, or four drums, constant or variable speed drive.

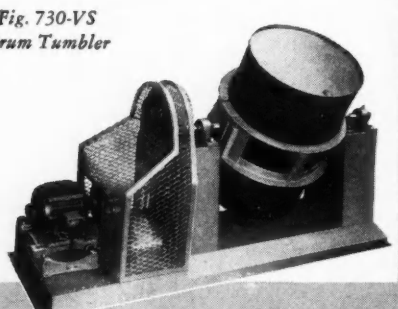
Fig. 745-S
Drum Roller



DRUM TUMBLERS

"U. S." Drum Tumblers are built in two sizes: single and double drum units to handle standard 55-gallon drums. Units to handle 30- or 70-gallon drums are available on special making order. Variable speed drive permits tumbling speeds from 8 to 21 RPM. Powerful, heavy-duty motor will handle loads up to 1,000 lbs. Adjustable yoke opens quickly and easily, locks securely.

Fig. 730-VS
Drum Tumbler



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PROCESS EQUIPMENT DIVISION

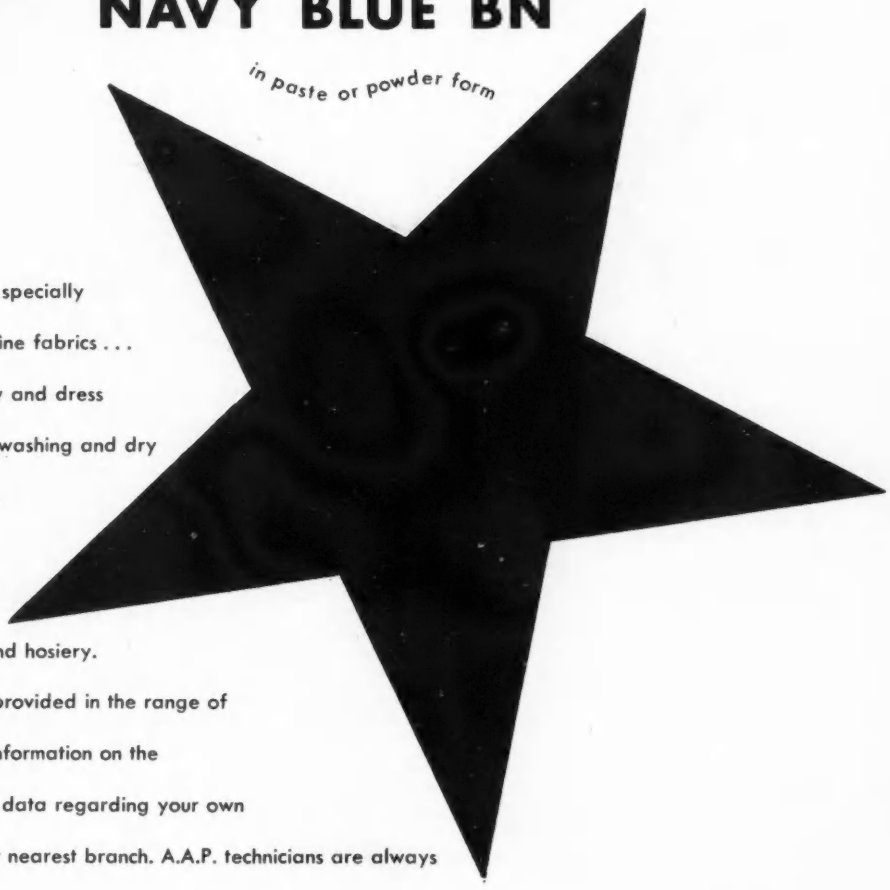
U. S. STONEWARE
Akron, Ohio

AMANTHRENE* VAT COLORS
provide the answer to the
demand for better
color fastness in textiles

Amanthrene

NAVY BLUE BN

in paste or powder form



An all purpose Vat Navy Blue . . . specially recommended for the printing of fine fabrics . . . particularly those, such as drapery and dress materials, where fastness to light, washing and dry cleaning is of primary importance. Regularly used for the dyeing of cotton and rayon piece goods, packages, beams, warps, skeins and hosiery. Just one of the handsome shades provided in the range of Amanthrene Colors. For detailed information on the whole range available, as well as data regarding your own particular requirements, consult our nearest branch. A.A.P. technicians are always happy to be of service.

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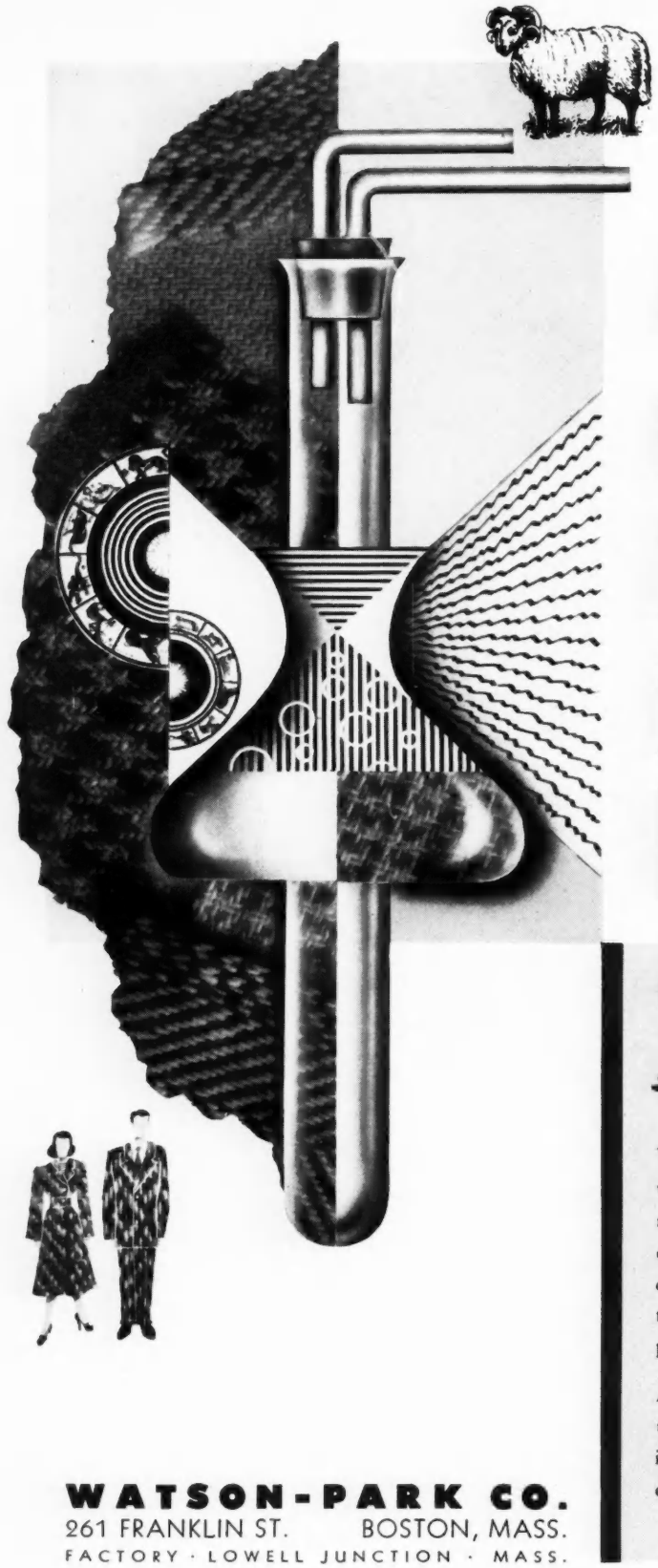


a new fabric is born

BUT...

How Will it Scour?

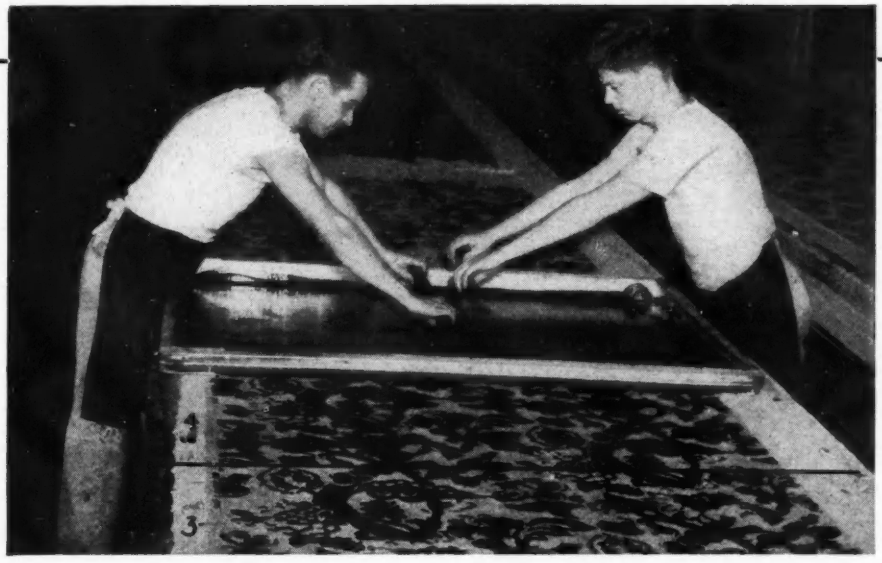
With a yard of your fabric in the grease we are in a position through our research laboratory to give you a complete detergency analysis. Join our many customers who are enjoying this service that offers you the most economical procedure for scouring your fabrics.

A Watson-Park representative will be glad to discuss your problems with you, or if you wish, just mail us the material you desire analyzed.

WATSON-PARK CO.
261 FRANKLIN ST. BOSTON, MASS.
FACTORY · LOWELL JUNCTION · MASS.

New! Resyn*

TABLE ADHESIVE FOR SCREEN PRINTING



Holds tightly! Releases cleanly!

NATIONAL'S quickly applied and reusable **TABLE ADHESIVE** holds unprinted cloth tightly to the screen table during the printing process. It replaces the tedious, time-consuming process of pinning.

NATIONAL'S TABLE ADHESIVE is a cold, liquid **RESYN*** adhesive that comes to you ready for use. It provides a light tack that prevents cloth slippage during printing . . . permits easy cloth removal after printing . . . and leaves the cloth clean and undamaged. In addition, it maintains a usable working tack for a period of several weeks. Ask for a trial demonstration in your plant.

National also produces: **AMBERTEX** a heavy-bodied thickener for white discharge, direct and vat color printing; **FLOTEX** to replace natural gums for printing; **FIBERTEX** for textile finishing; **NALEX** for cotton and worsted warp sizing; **FLOJEL** uniform, thin boiling corn starches in all standard fluidities; **HOOSIER** Pearl Cornstarch.

Offices: 270 Madison Avenue, New York 16; Boston, Philadelphia, Atlanta, New Orleans, Indianapolis, Chicago, San Francisco and other principal cities. In Canada: Meredith, Simmons & Co., Ltd., Toronto and Montreal. In Holland: Nationale Zetmeelindustrie, N. V., Veendam.

(*Reg. Trade Mark)

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY INDUSTRIAL USE

JUST TURN A VALVE to "PASS the SALT" ANYWHERE IN YOUR PLANT

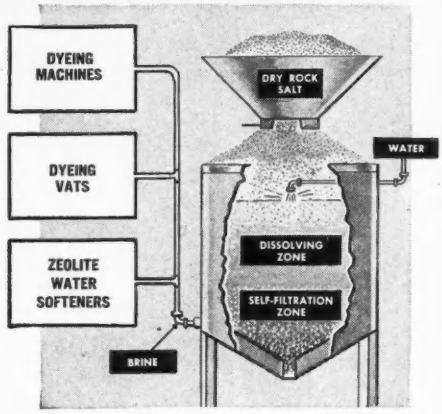
Put an end to SALT HANDLING *with* The LIXATE PROCESS *for making brine*

Weigh these production savings:

- **Eliminates shoveling salt from storage**
- **Ends hauling salt around the plant**
- **Saves time wasted in making brine**
- **Stops waste of salt by spilling**
- **Assures accurate salt measurement**

ECONOMICAL LIXATE BRINE made from Sterling Rock Salt has brought users savings as high as 20%. Completely automatic, the Lixator can be placed right at salt delivery or storage point. It supplies 100% saturated, free-flowing, crystal-clear brine by common steel piping to as many points in your plant as you wish . . . over any distance . . . by gravity flow or conventional pump and piping equipment. You simply turn a valve for pure, self-filtered brine that meets the most exacting chemical and bacterial standards for every salt need. It will pay you to investigate the Lixate Process for your plant.

HOW THE LIXATOR WORKS



In the upper zone—Flowing through a bed of rock salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the lower zone**—Through use of the self-filtration principle *originated by International*, the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

WHAT THE LIXATOR PROVIDES

- ✔ **Chemical and bacterial purity to meet the most exacting standards for brine**
- ✔ **Unvarying salt content of 2.65 pounds per gallon of brine**
- ✔ **Crystal-clear brine**
- ✔ **Continuous supply of brine**
- ✔ **Automatic salt and water feed to Lixator**
- ✔ **Inexpensive, rapid distribution of brine to points of use by pump and piping**

Completely flexible, a Lixate installation can be made to supply any needed brine requirement. No costly investment is required. The Lixator pays for itself out of savings. See how others have saved—write now for your copy of "The Lixate Process for Making Brine."

INTERNATIONAL SALT CO., INC., Dept. ADR-1 Scranton, Pa.

Name.....

Firm.....

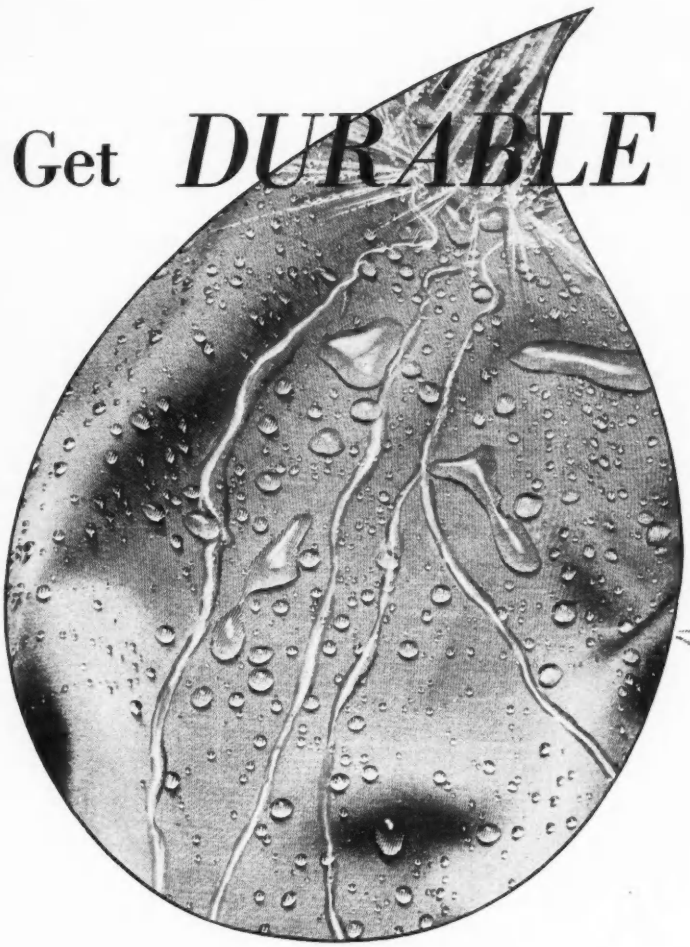
Street.....

City..... *State*.....

The LIXATE *Process*
Reg. U. S. Pat. Off.
for making brine
INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

Get *DURABLE* REPELLENCY

at the cost of ordinary fugitive repellent finishes



WHEN you want really lasting water repellency for cotton-rayon, cotton-acetate and many all-rayon, acetate and nylon constructions, use

REPEL-O-TEX D3 & D4

These two complementary materials, used in combination, insure low cost, exceptionally durable repellency, besides providing a stain and perspiration resistant finish.

Easy to apply in the jig, pad or quetsch. No scouring or curing is needed.

Any desired hand or finish may be obtained by suitably varying the proportions of Repel-O-Tex D3 and D4 used for the treatment.

A Trial Run Will Convince You!

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onyx **CHEMICALS FOR DYEING AND FINISHING**

Vanesta

THE STARCH STABILIZER

For Textile Sizing & Printing

R·T·VANDERBILT·CO·N·Y·
VANESTA
AMERICAN PRODUCTS

Holds Size Over Weekends

Maintains Fluidity

Stops Gelling

Sample on request

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.

"GANG BUSTER"

QUADRAFOS* helps break up stubborn soil accumulations in a hurry.

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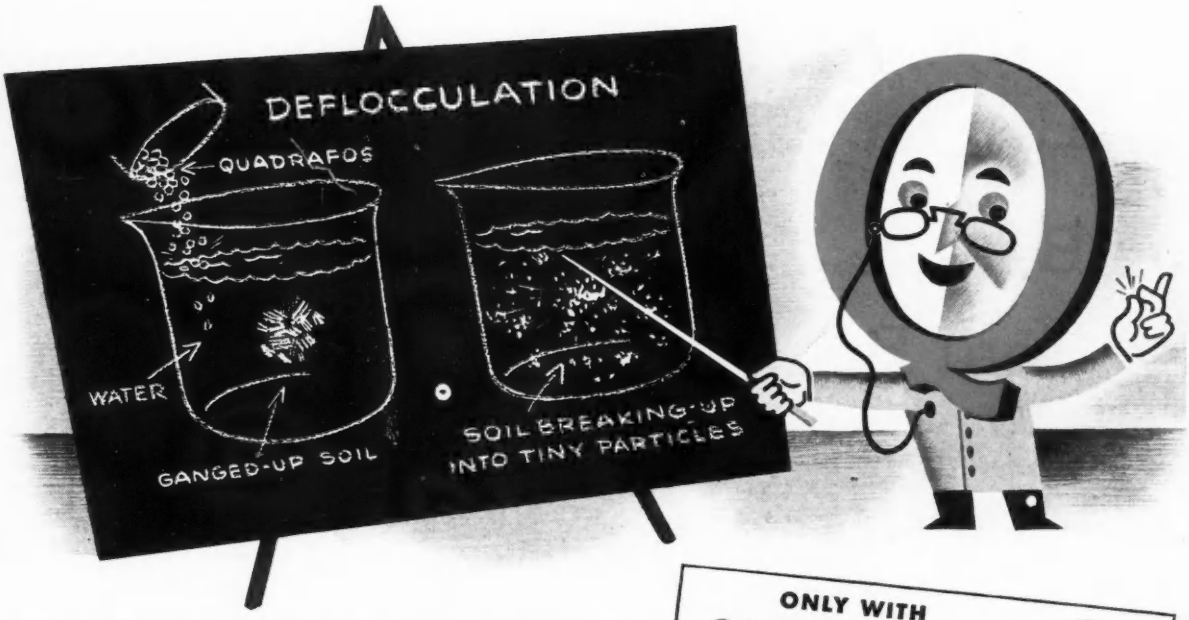

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Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Departments

Trade Notes—New Products..... 65

• Proceedings of the American Association of Textile Chemists and Colorists

One Hundred and Fifty-Ninth Council Meeting.... P42

Committees, Northern New England Section..... P43

Winter Meeting, Piedmont Section..... P43

Calendar P43

Cellulosic Fibers Group Meeting—
Pigmented Resin Emulsions for Printing and Pad Dyeing P44
Max Silverman

Testing Group Meeting—
Determination of the Solubility of Dyes..... P47
C. L. Zimmerman and H. R. McCleary

Non-Cellulosic Fibers Group Meeting—
Some Aspects of the Chlorination of Wool to Produce Shrink Resistance..... P52
Milton Harris and Daniel Frishman

Chemical and Physiological Aspects of Moth Protection P57
Hans Luttringhaus

Practical Experience in Vat Acid Dyeing (Discussion) P63

Meeting, Mid-West Section..... P63

Membership Applications P63

Employment Register P64

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Proceedings of the
American Association of Textile Chemists and Colorists

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JANUARY 26, 1948

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Members should notify the Secretary immediately of all address changes

One Hundred and Fifty-Ninth Council Meeting

THE Council held its 159th meeting in the Congress Hotel, Chicago, Ill., on Thursday morning, October 23, 1947. Present were President Henry F. Herrmann, presiding; John N. Dalton and C. Norris Rabold, Vice Presidents; William R. Moorhouse, Treasurer; Louis A. Olney, Chairman of the Research Committee; William D. Appel, Carl Z. Draves, Thomas R. Smith and P. J. Wood, Past Presidents; Edward S. Chapin and Walter J. Hamburger representing Northern New England; Robert W. Joerger and George H. Wood Jr. representing Rhode Island; Winn W. Chase, Emmett J. Driscoll, Patrick J. Kennedy, Leonard S. Little and Harold H. Taylor representing New York; Curt R. Baeringer, Arthur W. Etchells, Walter F. Fancourt 3rd, Lloyd O. Koons and Percival Theel representing Philadelphia; Wyss L. Barker, Raphael E. Rupp and R. Hobart Souther representing Piedmont; Andrew J. Kelly representing South Central; William B. Griffin representing Southeast; Eric W. Camp and Samuel Klein representing Mid-West; Kenneth H. Barnard, Chairman of the Convention Committee; J. Robert Bonnar, Chairman of the Executive Committee on Research, Miles A. Dahlen, Chairman of the Technical Program Committee; A. Kempton Haynes, Chairman of the Southeastern Section; Edwin R. Laughlin, Secretary of the Colour Index Committee; and Elmer F. Smith, Chairman of the Chicago Convention.

The Secretary's report on the 158th Council meeting and financial report of October 17, and the Treasurer's report of July 31st, were accepted. Additions to the budget for merchandise, office equipment and a further supply of presidential pins, approved by the Appropriations Committee, were voted. Investments by this committee since the last Council meeting were approved. To this committee, with approval in principle, was referred a motion to appropriate $25 per Sectional meeting for travel of speakers.

Formation of a Clemson College Student Chapter was authorized; also the formation of a Pacific Coast Section, provided the number of enrollments prescribed in the by laws be obtained. A petition for a Connecticut Section was referred to the Committee on Membership and Local Sections, together with W. F. Fancourt 3rd and R. W. Joerger.

For the Publications Committee Dr. Olney reported appointment of a Board of Editors for the Proceedings of the Association, consisting of J. N. Dalton, H. A. Rutherford, J. H. Skinkle, Percival Theel, H. M. Waddle and the Secretary. He reported progress by Professor Theel's committee on the new Analytical Methods, to be published as the first monograph of the Association. For the Colour Index Committee he reported on correspondence with the British Society of Dyers and Colourists regarding editorial policies, which the Council referred back to that committee for further consideration and correspondence.

For the Committee on Policy Mr. Little recommended confirmation by Council vote of the Association's practice of finding external manufacturers and vendors, so far as practicable, for test materials and apparatus sponsored by the Association, with suitable financial return to the Association for invention and sponsorship, and the Council so voted. With the approval of this committee the Council voted to authorize manufacture and sale without royalties, by the British Society of Dyers and Colourists of a Crockmeter identical with ours and bearing our name. A proposal of the same committee, that medals be designed and awarded to outstanding students in approved institutions of learning, was referred to a committee later appointed by the President, consisting of Joseph Lindsay Jr., Chairman, T. R. Smith, P. Theel, G. H. Wood, Jr., P. J. Wood and the Secretary. A report suggesting uses for convention profits was referred back to the Policy Committee for further study.

For the Convention Committee Mr. Barnard reported invitations from the three Southern Sections for a convention in Augusta, Georgia, October 21 to 23, 1948; and from the Philadelphia Section for a convention in Atlantic City, N. J. in the fall of 1949. Both were accepted.

Mr. Bonnar was elected Acting Chairman of the Research Committee, to serve until the next Council meeting, pending elections to that office and the Executive Committee on Research.

SECRETARY'S FINANCIAL REPORT

	Applications	*Dues, regular & reinstate*	*Dues, Corporate & Sustaining*	*Miscellaneous*	*Totals*
Received & transmitted to Treasurer,					
August 1, 1946 to May 28, 1947	$4,606.50	$30,220.50	$34,175.00	$19,609.44	$88,611.44
May 28 to July 31, 1947	648.00	172.50	110.00	2,964.54*	3,895.04
Total in fiscal year, ending July 31, 1947	5,254.50	30,393.00	34,285.00	22,573.98	92,506.48
August 1 to October 17, 1947	759.50	1,980.50	70.00	5.079.91**	7,889.91
Leaving deposited by Treasurer with Secretary					2,000.00
Miscellaneous items				*	**
Dividends and interest				$178.40	$338.20
Quartermaster contract					1,151.14
American Soap & Glycerine Producers contract				250.00	
American Viscose scholarship					1,500.00
Royalties, Launderometers				215.00	
Royalties, Flammability testers				140.00	184.00
Sale, Flammability testers				200.00	
Year Books				1,120.44	1,013.57
Reporters & Reprints				178.30	27.55
Crockmeters				302.00	336.00
Crock cloth				128.50	184.75
Moth Cloth				101.25	23.75
Water test apparatus				68.00	67.50
Color transfer charts				8.00	58.00
Knitted tubing				26.00	39.00
Dyed Standards				45.00	151.50
Gas fading units				2.00	3.00
Buttons				2.00	2.00
				$2,964.89	$5,079.96
Bank charges				—.35	—.05
				$2,964.54	$5,079.91

To Corporate membership was elected the Empire Color and Chemical Co.

Each of the following was elected to the class of membership specified, as of thirty days from publication of application, provided no objection be received meanwhile by the Secretary.

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Committees, Northern New England Section

AT at meeting of the Sectional Committee of the Northern New England Section held recently, Chairman George O. Linberg appointed the following committee chairmen:

Membership—Lyman Billings.

Corporate Membership—Edward S. Chapin.

Outing—Wallace P. Heintz.

Publicity—Herbert E. Wieland.

Dining—Edward B. Bell.

Seating—Delbert E. Ray.

Auditing—William W. Pennock.

Budget—Frank J. O'Neil.

Chairman's Advisory—Albert E. Sampson.

Intersectional Contest—David X. Klein.

Properties—Ernest R. Kaswell.

—♦ ♦—

Winter Meeting, Piedmont Section

PLANS for the Winter Meeting of the Piedmont Section at the Poinsett Hotel, Greenville, S. C., on February 7th have now been completed.

The technical session will be held at 3:30 P.M. and the following two papers will be presented:

"Current Dyeing Problems on Acetate-Viscose Blends and Suggestions on Meeting Them," by Herbert Scull of A. M. Tenney Associates.

"Package Dyeing of Yarns," by Herman J. Jordan, Jr. of Wiscassett Mills.

A banquet will be held at 7:00 P.M. and the speaker will be T. E. Christenberry, Clerk of the Court of Common Pleas and General Sessions for Greenville County.

CALENDAR

PHILADELPHIA SECTION
Meetings: February 27, April 9, May 14 (Kugler's, Philadelphia).

NEW YORK SECTION
Meeting: March 12 (Hotel New Yorker, N. Y.); May 7 (Swiss Chalet, Rochelle Park, N. J.).

PIEDMONT SECTION
Meetings: February 7 (Poinsett Hotel, Greenville, S. C.); April 3 (Robt. E. Lee Hotel, Winston-Salem, N. C.); June 18 (Ocean Forest Hotel, Myrtle Beach, S. C.).

NORTHERN NEW ENGLAND SECTION
Meetings: March 19 (Boston); April 16 (Lowell Textile Institute); May 21, June 11 (Outing); September 24 (Andover Country Club); November 19.

MID-WEST SECTION
Meeting: February 28 (Bismarck Hotel, Chicago).

SUB-COMMITTEES
Meetings: April 1, June 10.

COUNCIL
Meetings: April 2, June 11.

RESEARCH COMMITTEE
Meetings: April 2, June 11.

Cellulosic Fibers Group Meeting—

Pigmented Resin Emulsions for Printing and Pad Dyeing*

MAX SILVERMAN
Sherwin-Williams Co.

Introduction

PIGMENTED resin emulsions are, of course, compositions of matter. Therefore, any treatment of the subject, "Pigmented Resin Emulsions for Printing and Pad Dyeing" must of necessity be limited to those few emulsions of the very many possible ones, with which the writer is familiar. Not only is there a large choice of resins and resin combinations, but the number of emulsifying agents from which to choose is myriad anl growing daily. Each pigment used also has its specific effect on the properties of the emulsion in which it is used.

Definitions

"The concept of emulsions is by no mean as clean-cut as it should be" *(1).* Emulsions are generally defined as dispersions of one liquid in another. This connotes immiscibility between the two liquids, but definitions vary from the statement that the two liquids are immiscible *(2)* to "immiscibility under ordinary conditions" *(3),* to "incompletely miscible" *(4.)* Only two out of ten definitions make statements about the stability of the system, and the dispensed particles are described as fine, very fine, larger than colloidal size, and very coarse *(1).*

In this paper "lacquer phase" will be used to denote the organic component of the emulsion.

Pigments

These are coloring matters insoluble, or practically insoluble, in water and most organic liquids and resins. Those most commonly used are azo coloring matter, nitroso dyes, vat dyes in the oxidized state, and phthalocyanine blue and green. Another group is the inorganic pigments such as the precipitated iron oxides, and ultramarine blue.

The pigments play an important role in the development of a colored emulsion which can be successfully used to dye or print textiles.

1. They must be sufficiently light fast to perform, in this respect, up to the required standard.

2. They must be sufficiently brilliant and of the proper shade to meet the requirements of the trade.

3. Compared to pigments in general, they should be in the group of low specific gravity pigments.

4. The pigments should be organophilic.

5. The pigments should be of fine particle size.

6. They should be as highly dispersed as possible.

7. The pigment particles should be completely wetted by the lacquer phase.

The first two requirements, viz., light fastness and proper shade ar obvious and need no further elaboration.

A low specific gravity pigment is desirable since the more nearly the two phases are of the same specific gravity the less the tendency for the emulsion to separate into two layers *(5) (6).*

The pigment should be preferentially wetted by the organic phase and in particular the resins. This will insure the maximum protection of the pigment by the resins and will result in good fastness properties.

A pigment of fine particle size, if it is preferentially wetted by the lacquer phase will assist emulsification in the manufacture of water in lacquer emulsions *(7).* Fine powders which are preferentially wet by water will ordinarily make oil in water emulsions. The size relation between fine pigment particles and the dispersed globules of a good emulsion is of interest.

Prussian Blue is a very small particle size pigment. The mean diameter of Prussian Blue particles is about 0.2 microns *(8).* The bulk of the globules in a good emulsion is in the 1-5 micron range *(1).* As a rule the size distribution curves have a marked peak at a diameter of about 2 microns *(7).*

It is generally recognized that no reduction in particle size of the pigment occurs in the mixing anl milling process. It does aid however, in wetting and dispersing the pigment particles. A highly dispersed pigment system is desirable, because as more colored surface is made available, more color value per pound of pigment results. The quality of the product depends greatly on how nearly completely the pigment particles are wetted by the lacquer phase. A poorly wetted pigment has a marked tendency to settle out as a dry, hard, cake.

Resins

There is fast building up a considerable patent literature on the subject of pigmented resin emulsions for treating textiles. Typical resins and resin combinations recommended are:

1. A mixture consisting of Amberol F-7, castor oil and Tung Oil *(9).* The two oils are cooked at 420° F. to the gel point and the melted Amberol is then added.

2. A broad coverage of a "readily heat-polymerizable synthetic resin" *(10).*

3. A printing paste containing an alkyd resin solution, a paste containing both solvent souble urea-formaldehyde resin solution and ethyl celluose, and a paste containing solvent soluble melamine-formaldehyde *(11).*

4. A combination of ethylcellulose, nitrocellulose, glycerol-sebacic acid ester *(12).*

5. Carbamide-formaldehyde resin solution plus methyl abietate in the ratio of 2 to 3 parts by weight of the former to one part by weight of the latter *(13).*

6. A combination of a heat converting alkyd, ethyl cellulose, and butylated dimethylol urea *(14).* (solvent soluble urea-formaldehyde resin)

7. Satisfactory film forming materials are compounds of linseed oil, the cellulose ethers such as ethyl cellulose, the cellulose esters such as cellulose nitrate and acetate, resins such as phenol-formaldehyde, coumarin, urea-formaldehyde, and polybasic acid polyhydric alcohol types. Plasticizers are recommended but not named *(15).*

* Presented at Cellulosic Fibers Group Meeting, George E. Osha, presiding, National Convention, Chicago, October 24, 1947.

8. A resin composition, "consisting essentially of an interpolymer of one of the group of compounds consisting of styrene, vinyl acetate, and esters of methacrylic acid with a drying oil in which the drying oil is presented in an amount not greater than the other components." *(16).*

9. A combination of alkyds, one a linseed oil modified glyceryl phthalate resin, the other a linseed oil/china wool oil modified glyceryl phthalate resin. Urea-formaldehyde-monohydric alcohol resin is also added *(17).*

There are, it is evident, many resins from which to choose, and the combinations of resins possible are limited only by practical considerations. Obviously, experience has also ruled out many resins for one reason or another, and the general principles may be stated that:

1. At least one of the resins in any combination shoull be of the heat setting type (heat polymerizable).

2. The combination of resins in any given formula should be compatible, at least in the presence of the common solvent.

3. Drying oils should be present, if at all, in small amounts relative to the other resins.

The heat setting resin is necessary to insure good alkali resistance and resistance to organic liquids. Compatibility is desirable for stability of the emulsions as well as to insure strong films. Drying oils in large quantities are ruled out to avoid the danger of spontaneous combustion.

Pigment Resin Emulsions

Two types of pigmented resin emulsions are on the market today, "water in lacquer" and the reverse emulsion "lacquer in water." The former emulsion has found its greatest use in the field of printing, whereas the latter type, to date, has been used, almost exclusively in the field of pad dyeing.

Water in Lacquer Emulsions for Printing

The system now in general use consists of a pigmented resin emulsion, a so called color base and a colorless, transparent emulsion generaly referred to as a "clear" or "extender."

The color base has a pasty consistency about like that of cold cream, but there is considerable variation from color to color. The physical characteristics of the individual pigments appear to be the chief factor in determining the consistency of the paste, and since changes in the surface properties of pigments usually result in a profound change in the properties of the emulsion, such as loss of color strength and brightness and decreased stability of the emulsion, it is quite often found that a somewhat undesirable consistency is the least of several evils.

The color base is formulated to contain the pigment, resins for binding the pigment, organic liquids which are solvents for the resins and which also regulate the consistency of the paste, and water.

The "clear" or "extender" is an emulsion which contains from 3 to 6% by weight of a concentrate which acts as the emulsifier, from 20-25% petroleum solvent, and water. The non-volatile content of this emulsion is very low, and because of this, the extender serves as an excellent medium for reducing the color strength, without adding solids which would cause a considerable increase in the "handle" of the printed textile.

It is well to note the important role which the extender has in making the water in oil system for printing a success. Here is a method for making a clear emulsion of a creamy consistency suitable for printing, most of which will be volatilized upon drying, so that the film forming materials in the color base will be but little affected by contamination with the extender.

The method of preparing the extender is extremely simple in comparison with usual emulsion technique, and consists in dispersing the concentrate in the petroleum solvent and then adding the water in a fairly rapid stream under vigorous mixing conditions. A half hour is usually sufficient to prepare a 50 gallon batch including the weighing or measuring of the batch ingredients.

The color bases may be blended in any combination. The resulting light fastness will be that of the poorest color, but the light fastness of the individual colors are not affected by blending with other colors.

For instance, in a blend of a light fast blue with a yellow of poor light fastness to make a green, the yellow will fade, but the light fastness of the blue will not be affected. Some pigments are very permanent both in strong shades and as tints. For a good many pigments, however, the light fastness decreases the lighter the shade that is printed, and it must be remembered that in a blend of colors, those colors which are used in very small amounts are in effect present as pastel shades, which consequently will fade quickly.

Lacquer in Water Emulsions for Pad Dyeing

This is a more recent development than the water in lacquer emulsion and, based on our experience, a much more difficult development. In a way this is surprising since the literature on oil in water emulsions is much more profuse than that dealing with the reverse type. It has been our experience that although clear water emulsions are quite readily made, it becomes a much more difficult problem when pigmentation is attempted.

In the particular system with which I am most familiar, the pigment is part of the lacquer or disperse phase. This conclusion is based on the fact that all attempts in our laboratory to make a pigmented lacquer in water emulsion using hydrophilic pigments have resulted in a product which washes poorly. Also emulsions using organophilic pigments, in which a special attempt has been made to keep the pigment in the water phase by means of dispersing and wetting agents, always resulted in reduced color value. Presumably, although the pigment was probably well dispersed, it was in the phase of the emulsion which wet the cloth first and therefore lost color value due to excessive penetration.

The lacquer phase is high in "solids" content, and since the material is thinned with water, there is no fire hazard involved in the use of this emulsion.

The system consists of a concentrated color base, similar in appearance and consistency to a vat dye paste. The application consists in adding water, concentrated ammonia, and a small quantity of sodium alginate to make a water thin bath of the desired color strength. The sodium alginate is added as a 0.2% solution in water. Vigorous agitation is not necessary because the color paste is readily dispersible in water, and in fact it is undesirable, due to the possibility of creating a heavy foam.

The ammonia stabilizes the emulsion and prevents the pigmented resin from coating or sticking to the rolls of the padder. The bath is kept at room temperature. Excessive heat causes the emulsion to break.

The function of the sodium alginate is to prevent migration, and the amount used must be determined by experiment. In general, increasing amounts are used with increasing absorbency of the cloth. The type of weave and weight of the cloth are also important factors.

In our laboratory the color is said to have migrated if a dyeing is characterized by alternating deep and light lines. We assume the action of the sodium alginate in stopping migration to be a flocculating effect, sufficient to slow down the mobility of the dispersed particles but not severe enough to affect the stability of the emulsion. Excessive amounts of sodium

alginate cut the color strength considerably.

The cloth is run through a two or three bowl padder. For light weight cotton goods it has been found very desirable to dry by immediately running over hot cans after leaving the padder. Whatever the drying system used, it is necessary to have an even application of heat and hot air pressure, otherwise the shade will not be the same on both sides of the cloth.

The system depends for its fastness qualities on a heat setting resin, therefore curing at 310-325° F, for at least one minutes, after the volatile liquids have been removed, is necessary.

General Properties

In general, when properly handled, prints of the water in lacquer type pigmented resin emulsion, and dyeings of the lacquer in water type emulsions, are characterized by good light fastness and good washing properties. They have good resistance to dry cleaning, although there are several colors that do not dry clean. This occurs when the pigment itself is soluble in the dry cleaning fluid. The well cured resin film is itself resistant to dry cleaning solvents.

The limitations are that, where good "handle" and crockfastness are required, only medium to light shades can be used. There are however, in the printing line, many cases where small objects and stripes are printed in deep shades.

Conclusions

Pigmented resin emulsions have become established as useful tools in the field of textile printing and dyeing. These systems have obvious advantages, and as is true of most everything, some disadvantages. The exercise of good judgment will as usual indicate where and when these emulsions can be used to the best advantage.

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Discussion

Mr. Coke: Does pad dyeing stiffen the fabric seriously?

Mr. Silverman: If attempted in too heavy shades, it does. But in medium to light shades, the increase in handle is hardly noticeable, and I would say perfectly satisfactory. We have not been able to put deep shades on the cloth without stiffening the cloth too much, to date.

Mr. Nuessle: You said that vat dyes can be used. What is the difference in color value if you use a vat as a vat dye, or if you use a vat as a pigment?

Mr. Silverman: I can't tell you absolutely, but our experience has been that we tend to get more apparent color value when it is used as a pigment, probably because of the fact that it is kept on top of the cloth instead of losing considerable color value due to penetration. The few experiments that we have carried out in our laboratory indicate that we can get the same apparent color value with less color when used as a pigment.

Mr. Brosnan: Is it practical to dry after pad dyeing in an ordinary loop drier or in a closed tenterframe?

Mr. Silverman: A closed tenterframe would be more practical than a loop drier. The only difficulty in the drying is that we must insure uniformity of heat on both sides of the cloth, or uniformity of air pressure; otherwise there is a back to face. The most practical method on light weight cloth has been running directly over cans. For some reason or other, we get very uniform appearance on both sides of the cloth. But we have done some of the heavier weight materials on pin tenterframes successfully.

Mr. Brosnan: Is the critical point in the drying when you are evaporating the water, or when you cure?

Mr. Silverman: In evaporating the water, getting off enough of the water to stop the pigmented resin where it lies instead of allowing it a chance to move around. Once it is dry it can be handled and cured whenever and wherever it is most convenient to do it.

Mr. Claflin: How many other thickening materials have you tried besides sodium alginate?

Mr. Silverman: We have naturally gone through methyl cellulose and carboxy methyl cellulose and some of the gums, and for some reason we do not get as satisfactory an effect from them as from the alginate. I think it is because they have too great a flocculating effect on our emulsions. We seem to lose color value and get a mealy appearance with those particular colloids.

Mr. Claflin: Could you give any idea how a manufacturer of gums, celluloses or polyvinyl alcohol could find out whether it woud be suitable?

Mr. Silverman: As indicated in my talk, we recommend the use of small amounts of a .2 per cent solution. Samples of our pad dyeing colors can be obtained. They can be made into a dyeing bath. You can add various amounts of the particular gums in which you are interested, dye a piece of cloth, and see whether the appearance and the results are satisfactory.

Mr. Claflin: Do you think it would be necessary to pad the cloth, not simply to put the dilutions in cylinders and observe them.

Mr. Silverman: Even with the use of sodium alginate we do not have enough of a flocculating effect to get any discernible settling in a reasonable period of time, and any action severe enough to cause rapid settling would not give a true picture of what the action would be in a practical way.

Mr. Claflin: Did you ever try experimenting with a centrifuge to accelerate the settling?

Mr. Silverman: No, we haven't. We felt that our best method of approach was to judge a practical dyeing.

Mr. Moody: Is it necessary or recommended to wash after curing?

Mr. Silverman: It is not necessary. If the other properties satisfy the dyer and the customer, there is no real reason for washing. Washing does tend to give a somewhat softer hand and it even tends to brighten the shade somewhat. But there is no real necessity, when medium to light shades are dyed, to wash the cloth.

Mr. Moody: Does washing improve crockfastness?

Mr. Silverman: Washing improves crockfastness to some extent, but there is still, in all these pigment colors, some crock, even after washing.

Mr. Souther: Are you at liberty to tell what the pigment is in Sherdye Red RC, and is it more soluble in dry cleaning solvents than dry pigments?

Mr. Silverman: The Red RC is quite soluble in dry cleaning solvents. I wouldn't recommend it as a color that will withstand dry cleaning. I can tell you that the two weak colors in the pigmented resin line for dry cleaning are a good light fast yellow and a good red or pink.

Mr. Blum: In evaluating pigmented dyed goods, it seems to be a fact that

(Continued on Page P62)

Testing Group Meeting—

Determination of the Solubility of Dyes*

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RELIABLE solubility data are of considerable aid to the practical dyer. The greater use of continuous dyeing methods and changes in the design of dyeing machinery have increased the need for such data. In dyeing cotton and viscose rayon in a package machine or other types of pressure machines, very low liquor to fiber ratios are used. For example, in package machines, the ratio of liquor to yarn may run as low as 4:1. The maximum depjth of shade which can be obtained depends on the maximum concentration of dye in solution which can be prepared and this maximum concentration may be obtained from solubility data. In the dyeing of cotton and viscose rayon in continuous dyeing machines, the initial step is usually that of padding. In padding, other factors being equal, the depth of shade obtained on the cloth depends upon the concentration of dye in the pad liquor. When padding with water-soluble dyes, the dye in the pad liquor must be completely in solution or spots and streaks may result.

In wool dyeing, the problem of dye solubility is somewhat similar to that encountered in the dyeing of cotton and viscose. When dyeing in a piece dyeing machine, it is convenient to make a solution of high dye content which in some cases may be added to the kettle without further dilution. While it is not necessary in all cases for the dye to be in solution when added as a concentrate, the probability of obtaining spots and streaks is far less if the dye is in complete solution. In pressure dyeing equipment where very low dye bath to material ratios are used, the solubility of the dyestuff is even more important. Some proposed continuous dyeing methods for wool make use of padding as a means of obtaining a uniform distribution of color over the cloth. Here again, the depth of shade is dependent upon the solubility of the dye.

In the padding and dyeing of nylon with water-soluble dyes, concentrated dye solutions are necessary when dark shades are desired because of the relatively low sorption of water by nylon fabric. A padding of nylon with a pick-up even as low as 35% is definitely wet to the touch, and any physical contact removes the dye not actually sorbed by the fabric. This indicates that the optimum pick-up is less than 35%. Hence the heaviest shade obtainable can be ascertained from a knowledge of dye solubility.

In the dyeing of leather, the concentration of dye solution runs from 3 to 6 oz. per gallon and the temperature of dyeing seldom exceeds 145° F. Many dyes cannot fulfill the requirements of such a high solubility at these low temperatures. Hence, solubility measurements are useful in picking out dyes which are applicable under these conditions.

Paper may be colored by coating, staining, or beater dyeing. When coating or staining paper, the information needed is the maximum amount of dye that can be put into solution readily. In beater dyeing, low temperatures are encountered; thus, solubility data at low temperatures are important. In beater dyeing, the dry dye powder is usually thrown directly into the beater; hence, the rate of solution also is a factor of importance.

In the printing of acid and direct dyes, solutions frequently are made up in very concentrated form (up to 25% solution) and then stirred into the printing paste. Organic solvents are added to obtain solutions of such high strength. If the dye is not soluble, the paste may contain specks and lumps of undissolved dye and may produce undesirable prints. A knowledge of dye solubility is helpful in making up such formulations.

Thus it can be seen that the rate of solution, the solubility and methods of increasing the solubility of dyes are of interest in many fields of dye application. The conditions of application in these fields are so varied that neither one method of solubility determination nor any single set of solubility data can be applied in all cases. However, the method to be described in this paper can be used to obtain dye solubility data for most fields of application.

Theoretical Aspects of Solubility

An understanding of the theoretical aspects of solubility is essential, not only in the determination of solubility, but also in the intelligent use of solubility data. One needs to keep these fundamental principles in mind in order to be aware of certain errors which may be introduced in determining solubility by any given method.

The solubility of a chemical compound is its concentration in a saturated solution which is in equilibrium with the solid phase. One important aspect of this definition which should be emphasized is that of equilibrium. In a saturated solution the system is in a state of dynamic equilibrium; that is, the molecules leave the solid and go into solution at the same rate that molecules in the solution are deposited onto the solid. If every trace of the solid phase is removed from a saturated solution and the temperature is changed in a direction to decrease the solubility, the excess dissolved solute may not separate. Such a solution is said to be supersaturated. It is, therefore, essential that some of the solid phase be present in order that true equilibrium be established. However, even then, as pointed out later, a considerable length of time may be required for a supersaturated solution to come to equilibrium because of the slow separation of the excess dissolved solute.

The definition of a solution is quite important in any determination of solubility. A true solution may be defined as a homogeneous, molecular mixture formed spontaneously between two or more substances without chemical reaction. However, many so-called water-soluble substances do not form true solutions according to the above definition but exist in a state of aggregation which is not molecular. Solutions in which the solute exists as very highly associated molecular aggregates are commonly called colloidal solutions. Depending upon the nature of the solute, the degree of aggregation in a series of solutions may have any value from that of single molecules to

* Presented at the Testing Group Meeting, Miss Laura E. Pratt, Presiding, Chicago Convention, October 24, 1947.

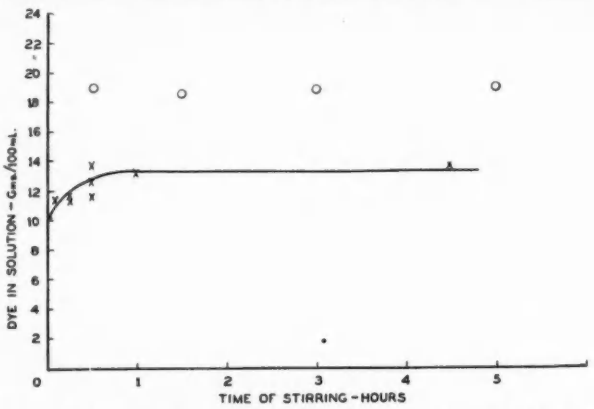

Figure 1—Effect of Time of Stirring on Amount of Orange II (98%) Dissolved in 6% Aqueous NaCl Solutions at 61° C.
X—Equilibrium Approached from Below Maximum Solubility
O—Equilibrium Approached from Supersaturated Solutions.

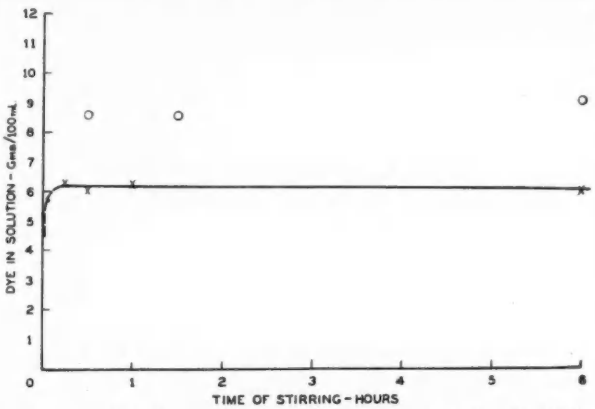

Figure 2—Effect of time of stirring on amount of Direct Blue BB (73%) dissolved in aqueous solutions at 61° C.
X—Equilibrium approached from below maximum solubility.
O—Equilibrium approached from supersaturated solutions.

that of very highly associated molecular aggregates; hence, the distinction between true solution and colloidal solution is one of degree and not one of kind. A comparison of aqueous solutions of sugar, dextrine and starch provides an illustration of this continuous gradation of degree of aggregation; the sugar solution is a true solution, while the dextrine and starch solutions may be regarded as semi-colloidal and colloidal, respectively. The work of Valko, *(6, 7)* and of Robinson and his collaborators *(1, 2, 3, 4, 5)* has shown that few dyes are dispersed in aqueous solutions as single molecules, although many probably exist as simple aggregates of 2 to 10 molecules. Many others have aggregation numbers of 100 or higher. It has been found as reported by Valko, *(6, 7)* that the degree of aggregation varies with temperature; hence it is possible to have a colloidal solution at room temperature which changes to a semi-colloidal or nearly true solution at higher temperatures.

Discussion of Methods

Since solubility is an equilibrium phenomenon, experimental efforts should be directed first to the attainment of equilibrium, that is, saturation. There are two ways of obtaining saturated solutions: (1) an excess of the solute is stirred with a known amount of solvent at a definite temperature until there is no further increase in the concentration of the solution; (2) the solvent is heated with an excess of the solute to a temperature higher than that at which saturation is to be determined, cooled in contact with the solid solute to the desired temperature, and then stirred at this temperature until the concentration of the solution becomes constant. The use of method (1) approaches the true solubility from solutions of lower concentration, whereas the use of method (2) approaches the solubility from higher concentrations. One is not sure that the actual solubility has been obtained until equilibrium has been approached from both sides. The determination of solubility by stirring a supersaturated solution in contact with the solid may require a much longer time than the procedure of stirring excess solute in solvent at a constant temperature.

In the case of many dyes, it is exceedingly difficult to approach the solubility equilibrium from a supersaturated solution. Figure 1 shows graphically the data obtained in attempting to determine the solubility of Orange II, C.I. 151, (98% pure) in 100 ml. solution containing 6 g. NaCl at 61° C. The solubility of this dye was determined in a 6% NaCl solution because its solubility is too high to be determined easily in pure water. Two sets of determinations are represented. In one set excess dye was stirred into water at 61° C. and in the other a supersaturated solution was stirred at 61° C. Each point shown in Figure 1 was separately determined and represents the amount of dye in solution corresponding to the time of stirring plotted along the abscissa. Figure 2 shows a similar set of data for Blue BB, C.I. 406 (73% pure). The results of these two dyes show that the solubility of dyes cannot be determined easily by approaching equilibrium from both sides because many dye solutions may remain supersaturated for long periods of time even in the presence of solid phase. If a choice is to be made between these two methods, that of stirring excess dye into water at constant temperature is probably more reliable since this avoids possible errors due to supersaturation. In any case, serious errors may be made if one attempts to determine dye solubilities by heating the solution to boiling, then simply cooling to the desired temperature and filtering.

It is apparent from Figures 1 and 2 that the time required to establish solubility equilibrium varies depending upon the dye used. Thus, in the case of Blue BB, 15 to 20 minutes' stirring is sufficient to establish solubility equilibrium; whereas, in the same time 85% to 90% of the saturation value was obtained in the case of Orange II. Since all of the determinations reported in this paper were made with stirring times of 15 minutes, the data in Figure 3 for Orange II may not represent completely saturated solutions.

The solubilities of dyes may be affected by the addition of almost any chemical to the dye bath. In some cases the solubility may be decreased; in others the solubility may remain unchanged; while in still other cases, a greater solubility may be obtained. These effects will now be illustrated.

Figures 3 and 4 show the solubilities of Orange II and Blue BB, respectively, in sodium chloride solutions of various concentrations; it can be seen that the solubility is markedly decreased with an increase in salt concentration. These data have important bearing on the solubility of commercial dye samples which may contain salt as an impurity.

Illustrative of added chemicals which have little or no effect on solubility is the effect of sucrose and cellosolve on Orange II and Blue BB as shown in Tables I and II, respectively.

Substances which increase the solubility of dyes are frequently referred to as hydrotropic agents. Tables I and II show the effects of several compounds on the solubility of Orange II and Blue BB, re-

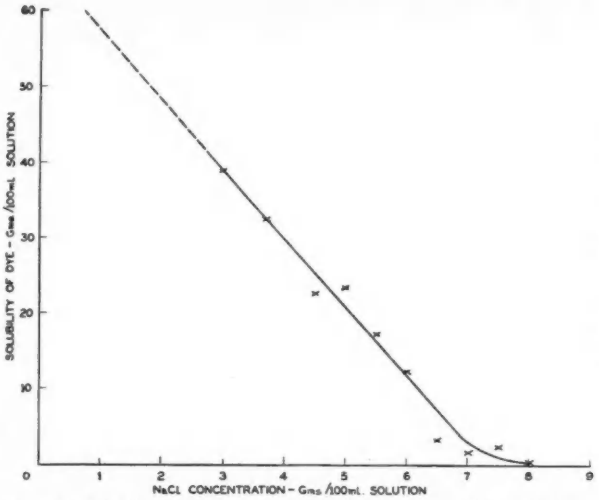

Figure 3—Solubility of Orange II (98%) in aqueous NaCl solutions at 61° C.

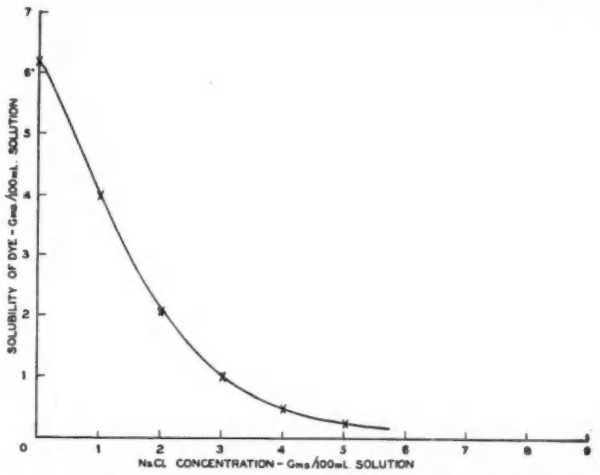

Figure 4—Solubility of Direct Blue BB (73%) in aqueous NaCl solutions at 61° C.

TABLE I

Solubility of Orange II in Various Electrolyte and Non-Electrolyte Solutions and at Various Temperatures

Chemical Added 6 g./100 ml. Sol'n.	*Solubility—g./100 ml. At 32° C.*	*At 60° C.*
None	20	(66.)
NaCl	<0.1	12.
Sucrose	13.	>45.
Urea	>30.	
Potassium Xylene Sulfonate	24.	>50
Cellosolve	17.	>50

TABLE II

Solubility of Blue BB in Various Electrolyte and Non-Electrolyte Solutions at Various Temperatures

Chemical Added 3 g./100 ml. Sol'n.	*Solubility—g./100 ml. At 32° C.*	*At 60° C.*	*74° C.*
None	3.0	6.2	8.0
NaCl	0.3	1.0	
Sucrose		6.2	
3 g./100 ml.		6.7	
Urea 6 g./100 ml.	6.0	7.4	
20 g./100 ml.		8.0	
Potassium Xylene Sulfonate		4.2	
Cellosolve		6.3	

spectively. It appears that potassium xylene sulfonate is a hydrotropic agent for Orange II but not for Blue BB. Urea, on the other hand, is a hydrotropic agent for both dyes.

A hydrotropic agent may increase the solubility of one dye as much as tenfold and have practically no effect upon the solubility of another dye. The mechanism of this phenomenon is not too well understood, but the effect in some cases is quite marked. For example, in the presence of four times as much urea as dye, a 10% solution of Calcocid Milling Orange 4R Conc. can be prepared; whereas when no urea is present, only a 2% solution of the same dye can be prepared under the same experimental conditions. Figure 5 shows two bottles, each containing 10 g. Calcocid Milling Orange 4R Conc. per 100 ml. solution. The bottle on the left, which contains no urea, shows a large amount of undissolved dye settled out; whereas, the bottle on the right, containing 40 g. urea per 100 ml. shows no undissolved dye. Cellusolve likewise increases the solubility of Calcocid Indo Blue B from 3% to 15%, but has practically no effect on Orange II and Blue BB. Therefore, only in specific cases are these substances of value in increasing the solubility of dyes.

In the case of most azo dyes having sulfonic acid groups, the solubility depends to a considerable extent on whether the dye is in the free acid or salt form of the sulfonic acid. In general, the free acid form of acid and direct dyes is less soluble than is the corresponding sodium salt. Thus, the addition of alkaline salts, such as sodium carbonate, may give a marked improvement in the solubility, particularly if the sample happens to contain a large amount of the acid form of the dye. However, one should avoid amounts in excess of that required to form the sodium salt of the dye because the solubility may be decreased by a salting-out effect. The data presented in this paper represent the solubilities of the dyes as sold; the addition of a small amount of an alkaline salt may increase the solubility of a few of them.

The solubilities of the alkali-metal salts of azo dyes are different from those of the other metal salts. Since various metal salts are found in hard water, all of the determinations reported in this paper were made with distilled water.

All of the preceding comments have been concerned solely with pure compounds uncontaminated by impurities or added blending agents. The procedure for determining solubility outlined in the first paragraph of this section must be modified if one desires to determine the solubility of a proprietary preparation, such as a commercial dye which may contain blending agents, such as, for example, common salt, which have been added to standardize the color strength of the dye. In such cases the solubility which is determined is the solubility of the dye in a salt solution and not the solubility in water. The solubility of the dye depends upon the strength of the salt solution in which it is measured (Figures 3 and 4); the strength of this salt solution in turn depends on the amount of commercial dye used to make the solubility determi-

Figure 5—Effect of Urea upon the solubility of Calcocid Milling Orange 4R Conc.

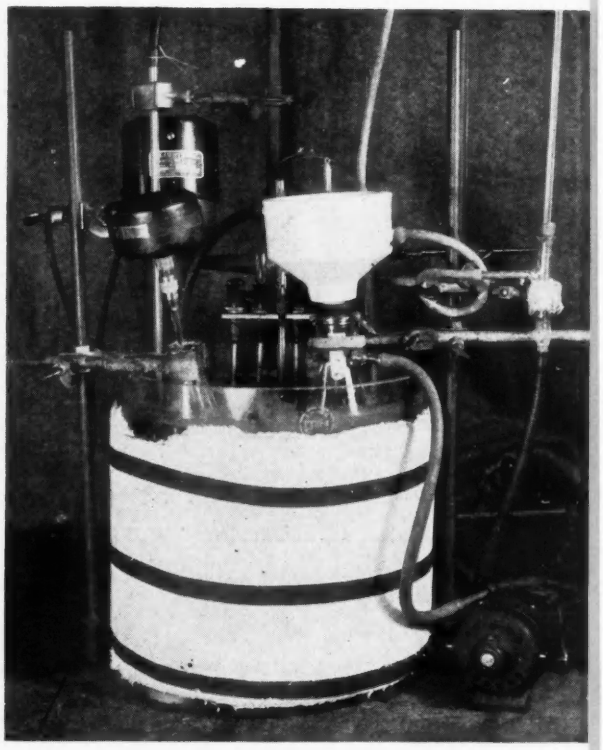

Figure 6—Constant temperature bath fitted with the stirring an filtering equipment.

nations. For example, suppose a certain pure dye has a solubility of 8 grams per 100 milliliters of aqueous solution; further suppose that this dye when sold commercially has been blended with 20% common salt. Then, if 10 grams of the commercial dye are slurried in 100 milliliters of solution, a 2% salt solution is formed containing 8 grams of available pure dye. This dye may not be soluble to the extent of 8 grams of pure dye per 100 milliliters in a 2% salt solution but, say, only 6.0 grams; hence, some of the dye will not be in solution. Similarly, if 20 grams of this same type are slurried in 100 milliliters of solution, only 4.5 grams of pure dye might dissolve in the resulting 4% salt solution. Since one is interested in the maximum solubility of commercial dyes, it is therefore necessary to determine the greatest amount of commercial dye (not pure dye) that will go *completely* into solution. The maximum solubility of a commercial dye can be determined only by a series of experiments. Such a series of experiments is shown in Table III for the determination of the maximum solubility of Calcomine Diazo Black BHD at 60° C. (140° F.).

It is apparent from the above data that the maximum solubility of Calcomine Diazo Black BHD is approximately 6.4 grams per 100 ml. at 60° C. (140° F.). This value is of interest to the colorist because he knows that if he always uses 6.4 grams or less of Calcomine Diazo Black BHD in 100 milliliters of solution at 60° C. (140° F.), there will be no undissolved particles or precipitate in the dye bath.

Some of the methods which have been used in the past for the determination of the maximum solubility of commercial dyes consisted of making a saturated solution of the commercial dye in the presence of a large excess of undissolved dye and then filtering. The solubility was determined either by weighing the excess of dye on the filter paper or by measuring the concentration of dye in the filtrate by dyeing experiments. Methods such as these may be in error, as pointed out in the above discussion, because no account is taken of the presence of salt in the excess dye used in the determination.

Method of Determining the Solubility of Commercial Dye

The method used for determining the maximum solubility consisted of stirring a known weight of dye in a known volume of water solution for 15 minutes at constant temperature. The slurry was then filtered through a jacketed Buchner funnel, maintained at the same temperature, into a flask immersed in a constant temperature bath. An aliquot of the filtrate

TABLE III

Solubility Determinations on Calcomine Diazo Black BHD at 60° C.

Amount of Starting Material g./100 ml. Total Volume	*Solubility of Commercial Dye g./100 ml.*
15	1.8
10	4.6
7.5	6.4
5	5.0
3	3.0

TABLE IV

Solubility of Dyes at 60° C. (140° F.)

Name of Dyestuff	Approximate Maximum* Solubility g./100 ml.
Calcocid Yellow MCG (C.I. 640)	30
Calcocid Fast Light Orange 2G (C.I. 27)	30
Calcocid Fast Red A (C.I. 176)	1
Calcocid Violet 4BXN (C.I. 698)	20
Calcocid Navy Blue 3R Conc. (C.I. 289)	20
Calcocid Alizarine Green CG Ex. (C.I. 1078)	3
Calcocid Blue Black Ex. Conc. (C.I. 246)	5
Calcomine Brill. Yellow Conc. (C.I. 365)	<1
Calcomine Fast Orange 2RS Ex. Conc. (C.I. 326)	7.5
Calcodur Red 8BL (C.I. 278)	7.5
Calcomine Violet N Conc. (C.I. 394)	2
Calcomine Sky Blue Ex. Conc. (C.I. 520)	10
Calcomine Brown M (C.I. 420)	2
Calcomine Diazo Black BHD (C.I. 401)	5

* Each value determined from a series of experiments as described in text using 1 g., 2 g., 3 g., 5 g., 7.5 g., 10 g., 15 g., 20 g., 30 g., and 45 g., starting material.

TABLE V

Effect of Temperature Upon Solubility

Name of Dye	Solubility—g./100 ml. 30° C.	60° C.	90° C.
Calcocid Fast Blue SR	3	7	11
Calcocid Orange Y Ex. Conc.	10	40	45
Calcomine Orange 5RE	0.8	2.6	2.8
Calcomine Brill. Violet 2R	11	18	22

was diluted quantitatively and the transmission measured on a recording spectrophotometer. Comparison of this spectrophotometric transmission curve with that of a solution of known concentration of the same dye permits the calculation of the dye concentration of the filtrate. The filter paper used was a coarse filter paper (Reeve-Angel No. 202). Although this filter paper probably does not retain very finely dispersed dye particles, it has a lower porosity than even the finest bolting cloth and therefore is a better filter. A picture of the constant temperature bath fitted with the stirring and filtering equipment is shown in Figure 6.

Solutions of some dyestuffs tend to jell or become viscous, especially upon standing. In determining the solubility of dyes by the filtration method described above, some of the saturated solution was allowed to stand in a constant temperature bath for two or more hours. If the solution jelled or settled, the procedure was repeated with progressively more dilute solutions until no jelling or settling took place. The dye concentration of this non-jelling solution was then called the solubility, rather than the figure obtained from the filtration test.

The approximate maximum solubilities of several commercial dyes in water at 60° C. as determined by the above method are shown in Table IV. The solubility figures listed in this table have been determined for each commercial dye by a series of experiments such as those listed in Table III. In the series of experiments for each dye, the amounts of starting material used in successive experiments were in the same order as those listed in column one of Table III; that is, 1 g., 2 g., 3 g., 5 g., 7.5 g., 10 g., 15 g., 20 g., 30 g., and 45 g. Results permitted a reasonably accurate estimation of the maximum solubility without further experimentation. For example, Calcocid Blue Black Ex. Conc. has a solubility which is less than 7.5 g. per 100 ml., but greater than 5 g. per 100 ml. at 60° C. Table IV, which lists the value of 5 g. per 100 ml. for this dye indicates that the solubility is at least this great, but less than the next highest value used experimentally. It is believed that the solubility values determined in this way are sufficiently accurate for most practical uses.

A change in temperature usually produces a change in the solubility of a dye. This is illustrated in Table V, which shows the variation in the solubility of four dyes over the temperature range of 30° C. to 90° C.

Summary

It has been pointed out that rate of solution, the solubility and methods of increasing the solubility of dyes are of interest in most fields of dye application.

The theoretical aspects of solubility have been discussed and related to solubility determinations of dyes.

The solubilities of dyes may be increased or decreased by the addition of various chemical compounds. The presence of salt blending agents in commercial dyes makes the determination of solubility more complex than the procedure used for unblended compounds. A method for determining the solubilities of commercial dyes has been described.

Acknowledgment

The authors wish to express their appreciation for the help and suggestions received from Dr. R. H. Kienle and Dr. G. L. Royer under whose supervision this work was carried out. Special credit is due to Mrs. Elizabeth H. Watts who made all the solubility determinations reported in this paper.

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Discussion

Chairman Pratt: There will be a few minutes for questions if there are some you would like to ask Mr. Zimmerman.

Mr. Seibert: In measuring the amount of dye in solution against your known quantity, did you measure it throughout the spectrum or at only one wave length?

Mr. Zimmerman: Complete spectrophotometric curves were run on both the known and unknown dye solutions. Since these solutions had the same color, comparisons could be made at any wave length. Our strength measurements were made at the absorption maxima of the dyes.

Mr. Gorsky: Are you familiar with the solubility of all your dyes? We are having trouble with solubility. We believe that precipitation occurs during dyeing and produces crocking as one of the results. Could you think of any reason why this might occur?

Mr. Zimmerman: It is difficult for me to give you an answer without knowing more about your particular problem. We plan to publish a list of the solubilities of all the Calco acid and direct dyes at a later time. Your trouble might come from hard water which would decrease the solubility of your dye.

Mr. Gorsky: I don't think so.

Mr. Zimmerman: Are you using very concentrated solutions? You may have a supersaturated solution. The customary method of making up dye solutions is to boil up the dye with a small amount of water and then dilute to volume. Using this procedure, supersaturated solutions may be formed even in the presence of some solid dye.

Mr. Gorsky: Even when the dye was used in small concentrations, the resulting dyeing crocked.

(Concluded on Page P56)

Proceedings of the American Association of Textile Chemists and Colorists

Non-Cellulosic Fibers Group Meeting—

Some Aspects of the Chlorination of Wool to Produce Shrink Resistance*

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THE historical development of shrink-resistant wool has not been unlike that of many of our major industrial developments. In general, there is always a considerable time span between an original discovery and the development of the discovery to a practical industrial process. This has not only been true in the textile industry—it is equally true in all industries. Thus, the first rayon was patented in 1884; yet there are many who feel that the rayon industry has really only achieved maturity in our generation. Mercerization was discovered almost 100 years ago but it was many years before the discovery was fully utilized. Similarly, shrink-resistant treatments for wool have been known for over 50 years and yet prior to the war not a single process even obtained a modest foothold in this country.

Research and development in the textile industry, like most industries, received great impetus during the war, and as the result of accelerated technical programs, made great strides in many fields. And perhaps one of the outstanding examples, brought about largely as a result of the efforts and support of The Office of the Quartermaster General is found in the field of shrink-resistant woolens. During the war the problem of washable woolens became an acute one since wool items such as socks were being used in quantities never before reached. There were no dry-cleaning facilities in the field—and the G.I. laundries were unable to give army socks the same care accorded wool by the careful housewife. The answer was found in the chlorination process *(1)* and at the war's end a whole industry had been converted to treating army socks and about 8,000,000 pairs per month were being so processed. As a result of such treatments, the average wear-life of the socks being more than doubled.

The success achieved with socks suggested that wider application of the chlorination reaction could be made on wool materials in general and accordingly a broad fundamental study of the reaction has been underway, a small portion of which I shall report this afternoon.

At the outset, it appears pertinent to define more closely the term "shrink-resistant wool", and although this has been done several times recently, I feel that it is of sufficient importance to bear repetition here. Wool fabrics may shrink as a result of two actions known as "relaxation shrinkage" and "felting shrinkage." The former is common to almost all textile fabrics and results from the stretching which occurs when yarns and fabrics are subjected to tension during processing. A portion of this stretch is retained as a sort of temporary set but usually when the stretched fabric is soaked in water, it "relaxes" and after a time it approaches its relaxed or equilibrium length. With some fabrics, a certain amount of mechanical action is necessary to speed the completion of the relaxation process. The magnitude of "relaxation shrinkage" varies widely with the type of fiber, the construction of yarn and fabric, but in general, it is of low order of magnitude; that is, in the range of a few to ten percnt. For the most part, the elimination of this type of shrinkage is achieved by processes such as Sanforizing for cottons and by London shrinking or sponging for woolens. In contrast, "felting shrinkage" is more or less unique to fabrics made entirely or in part of wool and other animal hair fibers and is caused by the tendency of these fibers to migrate, curl and become so entangled that it became practically impossible to separate them without considerable fiber breakage. It must be emphasized that treatments which reduce the tendency of wool to felt do not necessarily eliminate "relaxation shrinkage" but it is equally important to note that it is relatively easy to eliminate "relaxation shrinkage" from a fabric which has had an adequate anti-felt treatment.

The questions which now arise are why does wool felt and how is this felting inhibited by chlorination. Apparently wool possesses two distinguishing properties which contribute to the felting phenomenon:

(1) a tendency of the fibers to bend or curl or become entangled under the influence of moisture, heat, and mechanical working;

(2) the tendency of the fibers to migrate under these same conditions.

Several years ago at the annual meeting of this Association in Atlantic City, I discussed in detail the first of these two properties *(2)*. I should like now to refer briefly to the second, namely, the tendency of wool fibers to migrate during mechanical working of fiber, yarn or fabric. This is apparently the most important single factor contributing to felting.

It will be helpful if we will first consider those structural features of a wool fiber which might contribute to this behavior. It has long been known that a hair fiber is made up of cellular units arranged in three layers; an outer layer of scales called the cuticle; a middle region called the cortex; and a center core or medulla which is usually not present in fine grades of wool. If we focus our attention on the cuticle, we find it consists of overlapping scales like the shingles on a roof, such that when the fiber is rubbed from tip to root, it is about twice as rough as when it is rubbed from the root towards the tip. Accordingly, when a wool fabric is submitted to mechanical action as in laundering, the fibers tend to migrate in the direction of least resistance, namely in the direction of their roots. However, since portions of the fibers are tied down more or less securely in the yarn or fabric, the tendency to migrate, causes the fibers to wrap around each other and form an irreversibly entangled mass of fibers known as a felt.

In order to give you a visual demonstration of this migration tendency, we have prepared a model of a fiber which, when subjected to a rubbing action, actually migrates much like a wool fiber (Demonstrations).

An even more convincing demonstration of the contribution of the frictional properties to the migration tendency and fabric shrinkage is obtained in actual

* Presented at Non-Cellulosic Fibers Group Meeting. Robert C. Anderson, Presiding, Chicago Convention, October 24, 1947.

measurements[1] of the surface friction of treated and untreated wool fibers, as shown in Table 1.

TABLE 1

Treatment	Area Shrinkage[1]	Coefficient of Friction[2]	
% Chlorine	%	μ_1	μ_2
Untreated	69	0.39	0.19
5	28	.39	.22
7	12	.44	.36
10	6	.47	.44

[1] Two hour machine laundering, soap, 150° F.
[2] μ_1 is coefficient of friction against scales; μ_2 with scales.

The most noteworthy feature of the data in Table 1 is that as the severity of the treatment is increased, the value of μ_2 increases until it approaches that of μ_1. Presumably this tends to reduce or eliminate any preferential migration tendency with a corresponding decrease in shrinkage of the fabric during laundering.

It is apparent from the foregoing discussion that the problem to be faced in the chlorination of wool is how to alter the surface frictional properties of the fiber without at the same time impairing other desirable properties of the fiber such as strength, elasticity, hand, etc. Those of you who have studied the chlorination reaction on wool, or worked with most of the earlier industrial chlorination processes, will recognize this as a difficult assignment indeed.

Fortunately, from a laboratory analytical point of view, but not from a practical point of view, the main point of attack of the chlorine is on the disulfide crosslinks which hold the wool molecules together. It has been shown repeatedly that alkalies, oxidizing and reducing agents damage wool by attacking these cross-links with an accompanying loss of strength, elasticity and hand. Based on these earlier studies a number of useful analytical tools, *(3, 4)* have been developed for evaluating changes in structure of this type and these have been used to good advantage in studying the present reaction.

In these studies it was found that many variables such as concentration, temperature and time influence the final results but that by far the most important single factor is the pH of the active chlorine solution and for this reason, the remainder of this discussion will be devoted to a consideration of the effects of pH on this reaction.

Just how important pH may be is indicated in Figure 1. The oxidation potential at pH 1 is nearly three times as great as the potential at pH 10. The potential

[1] The technique and apparatus used for these measurements will be described in a forthcoming publication.

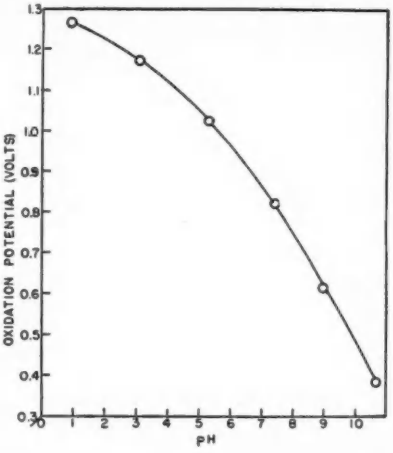


Figure 1. The Oxidation Potential of Sodium Hypochlorite Solutions as a Function of pH.

decreases uniformly with increasing pH and as would be expected from this, the intensity of the effect on the fibers follows the same trend as shown in Figure 2.

Similarly there is a rather uniform change in mechanical properties with pH, the properties becoming poorer as the pH decreases (Table 2).

TABLE 2

pH of treatment	30%[1] Index	Compressional Resilience (5)
1.1	84	51
3.1	85	50
5.2	88	53
7.4	93	52
9.2	97	55
10.7	96	57
Untreated	99	57

[1] See reference (4). The 30% index is the energy required to stretch a wet fiber to 30% elongation after a treatment divided by the energy requirement prior to the treatment. The smaller the values in this table, the more modification of the fiber has occurred.

The data presented thus far are all consistent with the observed change in oxidation potential with pH. It could be inferred from this that the reaction of chlorine with wool is a simple reaction indeed. Unfortunately, this is far from the case as is found from a closer examination of some additional experiments. True, the intensity of the reaction decreases at the higher pH values, but nevertheless the reaction is apparently different in different pH regions. For example, when a study was made of the rate at which chlorine is consumed in this reaction, at a series of pH's from 1 to 11, there was considerable evidence that possibly three types of reactions occurred; one in the region of pH 1; another in the pH range from 3 to 8; and still another from pH 9 to 11.

In Figure 3, it can be seen that the reaction is extremely rapid at pH 1; somewhat slower in the range of pH 3 to 8, and much slower above pH 8. Further evidence of the existence of these three regions is shown in Figure 4. Attention is first directed to the curve representing the loss in weight of the wool substance since this has sometimes been used by workers as a criterion for damage. At pH 1 there is nearly a 10% loss in weight; this is in agreement with some of the photomicrographs in Figure 2, which show the scales to be entirely sloughed off at low pH values. As the pH is increased, there is only a slight change in weight of the fiber and at pH 5, the wool actually shows an increase in weight. From studies of this type it might be concluded that the optimum pH for the chlorination treatment is in the region of pH 5.

But now let us turn to the alkali-solubility data. The alkali solubility measures the number of broken cross-links; the more links broken, the higher the alkali-solubility. You will note here that in the region of pH 5, where there was an actual gain in weight, the alkali-solubility was highest, being over 36%. Actually, what has happened here is that there is probably no appreciable weight loss but the sulfur had been oxidized, breaking cross-links and at the same time causing the observed increase in weight. Wool showing an alkali-solubility of 36% must be considered to be severely damaged. What is desired of course is a treatment which produces a minimum loss in weight and a minimum alkali-solubility. This, it is noted, occurs in the region of pH 8 to 9.

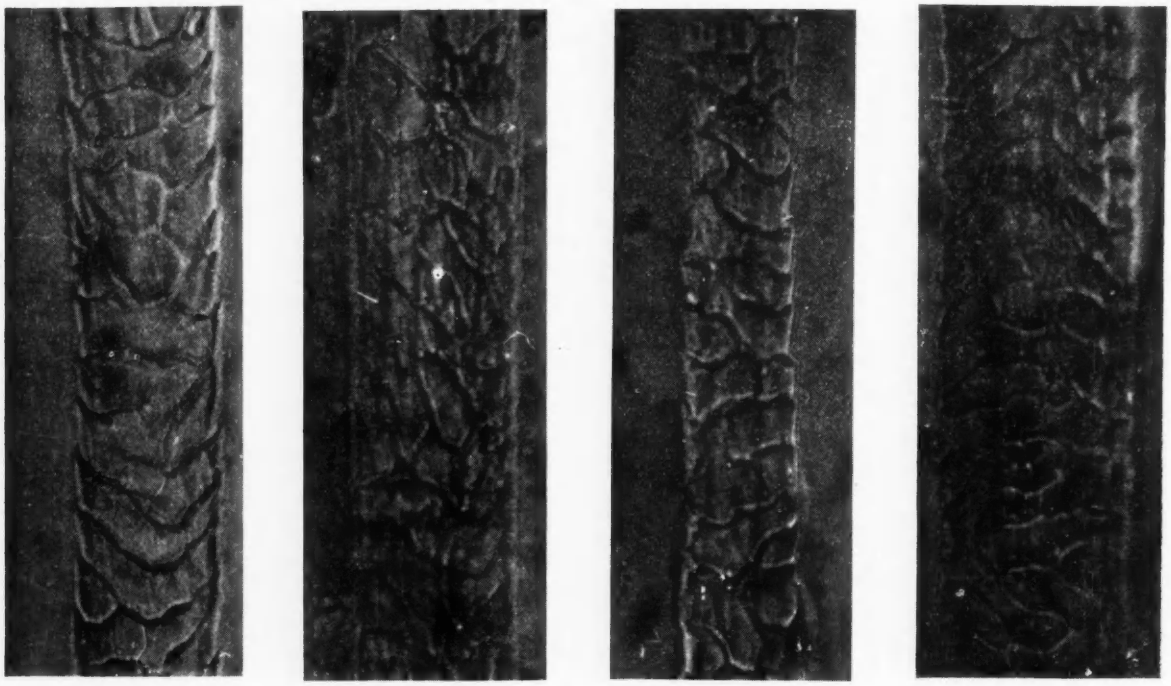
From a practical point of view the question has been frequently raised as to whether conditions are obtainable which will give adequate shrink-resistance and still allow the fiber to retain its desirable mechanical properties. The answer is found in the data in Table 3.

TABLE 3

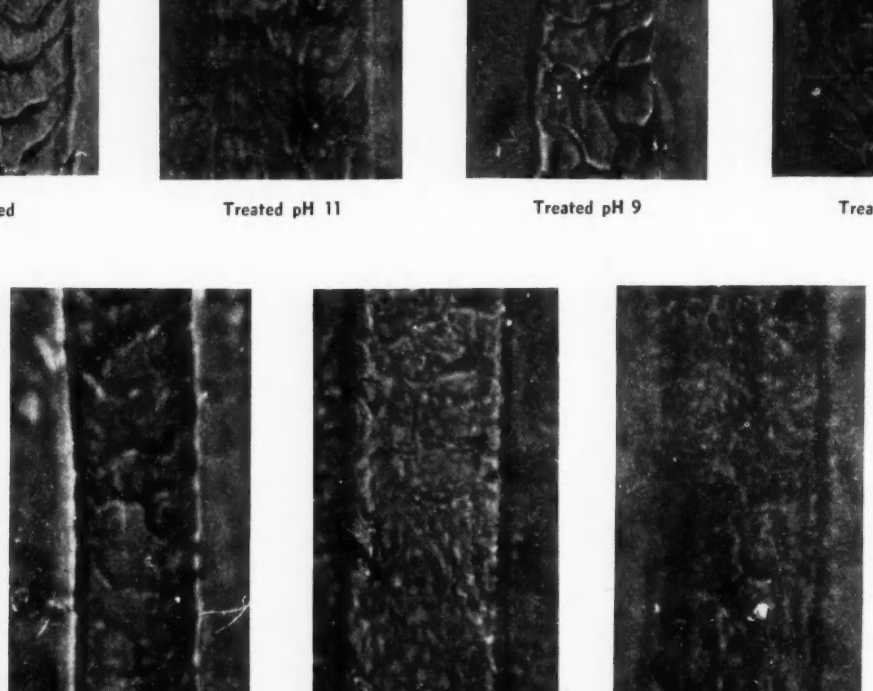
pH of treatment	Area Shrinkage	Alkali Solubility
	%	%
10	2	7.4
9	0	9.4
8	2	9.4
6.5	3	12.1
4.2	5	15.3
1.0	6	9.2
Untreated	27	6.5

The low alkali-solubility obtained on the sample treated at pH 1 is due to the fact that the fiber has already lost considerable weight during chlorination at this pH.

There have been many lectures, round table discussions, and published articles appearing under the general title of "fibers of the future". Practically all of these



Untreated | Treated pH 11 | Treated pH 9 | Treated pH 7



Treated pH 5 | Treated pH 3 | Treated pH 1

Figure 2. Photomicrographs of Impressions of an Untreated Fiber and of Fibers Treated with Sodium Hypochlorite Solutions (9% Cl on Weight of Wool) at Different pH Values. Magnification = x485.

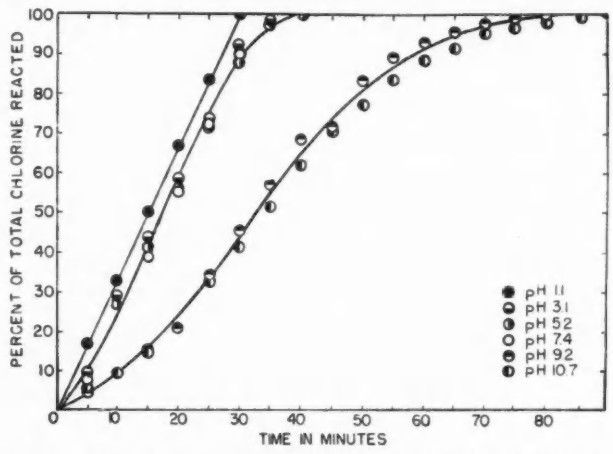


Figure 3. Rate of Reaction Between Sodium Hypochlorite and Wool at Various pH Values.

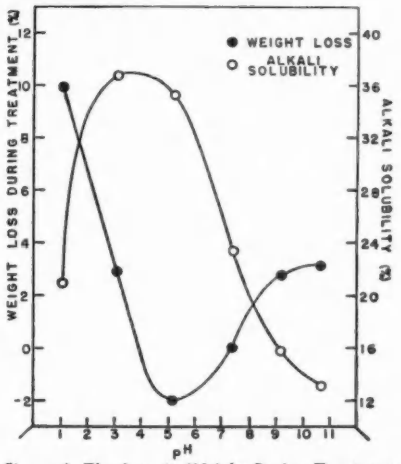


Figure 4. The Loss in Weight During Treatment and the Alkali Solubility as a Function of the pH of the Hypochlorite Treating Solution.

have centered around the discussion of rayon, nylon, Vinyon, Velon, Aralac and many others of less commercial, importance. But to this growing list must be added one more, chlorinated wool, because there is being produced today in laboratory, pilot plant, and on a commercial basis treated fibers which behave so differently from untreated wool that they must now be considered as a new raw material for the textile industry.

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Discussion

Chairman Anderson: Have you any questions you would like to ask Dr. Harris?

Mr. Bentert: Operating in the pH range of eight to nine, how much yellowing do you encounter?

Dr. Harris: Without any bleaching subsequent to the chlorination treatment, it is possible to operate in the region of pH-8 to 9 on wool fabric or top, and actually come out with a whiter wool.

From the Floor: Does such treatment of the wool have any effect on carding and spinning?

Dr. Harris: We have treated, I would say, between twenty and thirty thousand pounds of top in the last couple of months, and the spinners have not been able to distinguish it from untreated fiber. There is an increase in friction and some feel that the treated top has some real advantages, actually spins better. I would rather be conservative at this time and say there is no difference as far as spinning is concerned.

Mr. McGrupin: Is the pH factor a variable when you have a blend of medium to fine wools?

Dr. Harris: Well, in general, as you all know, most types of fine wool require more adequate antifelt treatment than some of the coarser wools, and we are doing considerable experimentation along those lines. By and large, on everything from a blend of 64-70's down to 50's, we have been able to use the same treatment. It may be desirable to go to a little stronger treatment for grades above 64's. So far we have had adequate results with the same treatment for 64's down to 50's. That is the principal range in which we have been working.

Mr. McGrupin: Does the type of wool make any difference, from various parts of the world?

Dr. Harris: I can't answer that because we don't have enough background. So far we have probably worked with a dozen types of wool and they all work well. Theoretically there ought to be a difference because we all know that there is a wide difference in the degree or the ease with which various types of wool felt. I'd rather not give an unqualified answer now, because I don't think our experience is with enough types.

Mr. Scott: Have you had any indication of whether it is going to be practical to chlorinate reused and reprocessed wools, or wools containing appreciable quantities of reused and reprocessed wools?

Dr. Harris: We haven't done anything aloang those lines. Those of you here who have worked with chlorination know that it is enough of a headache to make good wool shrink-resistant. I don't see why it couldn't be done however. As a matter of fact, it ought to be a relatively easy job because reused wools don't felt so easily.

Mr. Moertel: After chlorinating wool, as in one batch of men's hosiery, and then dyeing that batch of wool, I have noticed that while several stockings are perfectly level, some don't match the other stockings in the same batch. What causes that?

Dr. Harris: I'd like to point out before I answer that question that there are as many chlorination processes today as there are laboratories working on the problem and you can't generalize on them. What you want is an answer to your process.

Mr. Moertel: Yes.

Dr. Harris: And I don't know your process.

Mr. Moertel: No.

Dr. Harris: Chlorination is essentially a non-uniform reaction. Everyone in this room who has had experience with dyeing knows that if you dye wool fibers they dye very non-uniformly. A portion of the fibers will be completely dyed before the dye even starts to go into others, but this difficulty is overcome by levelling. When you start treating with chlorine, you can never level out, and when you have over-treated part of the wool, you can never go back and make up for the over-treated part. Therefore you have got to insure complete uniformity of treatment before you start. I think that what has happened is that these socks dye differently due to the fact that in batch processes—and you are talking about batch processes—the reaction is not uniform.

Mr. Moertel: Within the same batch?

Dr. Harris: Yes, because it is practically impossible under most of the batch treatments, to obtain uniform treatment.

Mr. W. R. Dean: Dr. Harris, how do the end properties of the chlorinated wool compare with those produced by the alcoholic methods, or the most recent alcoholic method which was the subject of a recent patent, I believe, by Peabody?

Dr. Harris: I will answer the first part of the question. During the war, we had occasion to study the alcoholic potash method in great detail for the Quartermaster's office. At one time I was very impressed with this process; we obtained some good results but they were never adequate. There was always a tendency for fabrics so treated to shrink a little more and more. We never knew why until we found that we could cut the differnce between the high coefficient and the low one only about two-thirds of the way and never any more. We have had occasion to work with this process and we found that you can never eliminate, by the alcohol potash process as it has been developed, this differential migration tendency.

Mr. Morrison: You gave us the more favorable pH, Doctor, but the previous processes that I am familiar with in chlorination have been at a much lower pH. You didn't mention the time element of the pH 8 to 9. Was it short or long?

Dr. Harris: Very short. But the reason people have gone to a lower pH is on account of color.

Mr. Morrison: From my experience, I would say that your process is much more favorable to subsequent dyeing.

Dr. Harris: Of course you are talking to a prejudiced man. We get remarkable uniformity of dyeing.

Mr. Evans: You say the scales of the wool are the least resistant to chlorine?

Dr. Harris: It has to attack the scales before it attacks the rest of the fiber. Anyone working with wool knows that you can't dye the cortex of the wool fiber until you get the dye through the scales. Let me put it this way: The solidity of the scales is a determining factor. If you damage the wool by alkali or chlorine, which will destroy the scales, then you can dye at a much more rapid rate. So, physically, what you want to do is to attack the scale itself with chlorine before you get near the cortex.

Mr. Claflin: In controlling pH do you use a buffer solution? Have you had any variation according to the buffers you use?

Dr. Harris: We prefer to run within a range of .2 of a pH.

Mr. Claflin: Would a phosphate work?

Dr. Harris: Actually, we are using a borax buffer.

Mr. Claflin: And borax and phosphate work about the same?

Dr. Harris: Yes. We investigated this point considerably because there was some indication that certain types of buffers affect oxidation potentials, but the contribution in this range is of minor importance.

Mr. Holland: On chlorinated wool, is there any difference in the shrinkage whether it takes place under alkaline or acid conditions? Perhaps I should say the felting of wool. Does it felt more or less under acid or alkali?

Dr. Harris: I can't answer that in a simple way because there is no simple answer to it. Actually most people who practiced chlorination by the conventional processes, have achieved better shrinkage control in working with acid. Probably the reason is that it reacts more violently with the fiber. Actually, in our system, we get better shrink-resistance in alkaline treatments.

Mr. Holland: I mean alkali felting, not in the alkali treatment. Are you going to do felting under alkaline as you do lots of times under acid conditions?

Dr. Harris: I see what you mean. There was an interesting paper published in the Journal of the Society of Dyers and Colorists on different types of anti-felt treatments on whether you followed with acids or alkalis.

—♦ ♦—

Solubility of Dyes—

(Concluded from Page P51)

Mr. Zimmerman: I might be able to help you if I knew more about your problem. If you will take it up with me later, I'll be glad to do all I can to help you.

Dr. Fourt: You showed us that you could improve solubility by the addition of certain agents. Did you carry your work further to see what effect these agents had on the absorption of dye by the fabric?

Mr. Zimmerman: We have done some work but we haven't done as much in that direction as we hope to do.

Mr. Bigelow: Do you consider the fifteen minutes' stirring time satisfactory for all of the dyes with which you were working?

Mr. Zimmerman: We believe that we reached at least 90% of the equilibrium value of all the dyes examined. In the case of many dyes, completely saturated solutions were obtained after fifteen minutes' stirring. However, as explained in connection with Table IV, the solubility of the commercial dyes listed do not necessarily represent 90% equilibrium because the determinations were made between rather wide limits.

Mr. Bigelow: At what temperature?

Mr. Zimmerman: Sixty degrees Centigrade which is one hundred forty degrees Fahrenheit. We also made a few solubility measurements at 30 degrees and 90 degrees Centigrade.

Mr. Goldthwait: I happen to be interested in dyeing from alcoholic solution. Do you have any suggestions for increasing the solubility of dyes in alcohol?

Mr. Zimmerman: The only suggestion I can think of is to obtain the dye in some form other than the sodium salt. You want a dye similar to an oil or spirit soluble dye. Dyes in the form of the alkali metal salt are not usually soluble in organic solvents.

Mr. Harms: We have an odd situation. The dye is boiled up in enough water to make what is apparently a good solution. After the dye is dissolved, it is strained through two or three layers of cheesecloth or any heavy cotton cloth to remove any undissolved dyestuff. The dye is run into the machine and brought to the boil and boiled for, say, 60 minutes. Common salt is added during the course of the dyeing. At the end of the dyeing time, the bath is dropped, the material rinsed, and removed. When the dyed cotton is examined, we find precipitated dye on the fibers, yet there were no dye particles on the straining cloth. How does that precipitation occur? The dye is in solution when put into the machine.

Mr. Zimmerman: I can think of two possible answers. One is that your original dye solutions may be supersaturated. You can filter a supersaturated solution through the finest filter paper and it comes right through leaving no solid particles on the paper. Such a solution is not in stable equilibrium. Sometimes the addition of only a trace of some solid material will cause precipitation.

Another possible explanation is that the salt added during the course of dyeing decreased the solubility of the dye to the point of precipitation.

Mr. Harms: Are you suggesting that I use less salt?

Mr. Zimmerman: No, I don't suggest that, but would advise that you add the salt in several small portions over a longer period of time.

Notice to Local Section Secretaries:

Send all papers, discussions and reports to the National Secretary.

Send advance notices of meetings to the American Dyestuff Reporter.

Non-Cellulosic Fibers Group Meeting—

Chemical and Physiological Aspects of Moth Protection*

DR. HANS LUTTRINGHAUS
General Dyestuff Corporation

Introduction

When the office of the Quartermaster General sent The Textile Team to Europe, Werner von Bergen of Forstmann Woolen Company obtained a report of research on the clothes moth from Helmuth Reumuth. This paper was translated by me and published by the Textile Research Institute, May 1946—"Mothproofing of Woolen Materials in Europe". With the report came many excellent colored slides of which I shall show you a selection.

I—Chemical

Before discussing the life history of the moth and its digestive process, we shall consider the chemical constitution of some moth protecting agents and we shall try to explain why and how they work. It is beyond the scope of this paper to discuss the vast number of patented mothproofing agents and their qualities. The fact that a product is not mentioned here is not to be taken for a criticism.

Only a few will be mentioned in an attempt to explain the action of mothproofing agents.

Formula 1 (Fig. 1) shows DDT, dichlor-

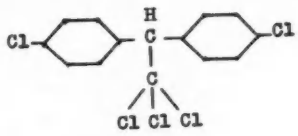

Figure 1.

diphenyl-trichloro-methyl-methane which is generally accepted as a contact poison, acting primarily on the nervous system. A larva of the clothes moth which has contact with the wool is poisoned relatively easily because it cuddles against it and spins constantly, using DDT treated wool for its feeding tube, but a larva of the carpet bettle is practically unaffected. The reason for this might be found partly in its protecting coat of hair, but since its mortality rate is seldom higher than 30%, even after one month, it shows that DDT is not an efficient contact poison for carpet beetles. However, after a 30 day incubator test, wool treated with DDT is not attacked by carpet beetles. Therefore, DDT must have also certain repellent properties which have not been explained. As early as 1929 condensation products of halogenated phenols with aldehydes of the general formula shown in

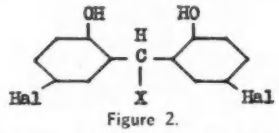

Figure 2.

Figure 2 were patented as moth repellents of which one is now on the market as a mildewproofing agent under the name of Preventol GD. This product has also a repellent action for carpet beetles without being a stomach or contact poison, in spite of the additional OH groups. The similarity to DDT is evident.

Laeuger, Martin and Mueller published in the *Helvetica Chimica Acta*, 1944, Vol. 27, 892-928, their extensive work on mothproofing agents. One result of this thorough investigation was Mitin (Fig. 3).

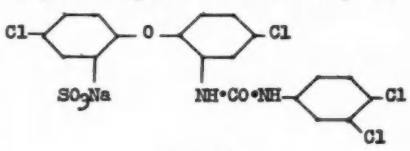

Figure 3.

The toxic component in this product is given by the authors as shown in Figure 4.

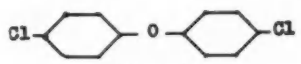

Figure 4.

It is said that wool treated with Mitin actually gets into the intestinal tract of the larva of the clothes moth and therefore acts as a stomach poison. In contradistinction to this it has been established definitely, and it will be explained later, that wool treated with Eulan CN (Fig. 5) is not eaten and does not enter the intestinal tract of the clothes moths. They die of starvation.

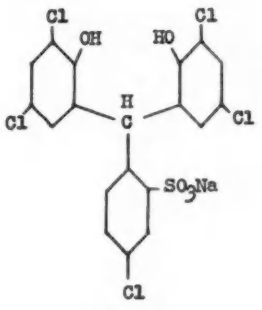

Figure 5.

However, if we take for incubator tests larvae of the carpet beetle *(Attagenus)* we obtain different results. We find that Eulan CN results in a carpet beetle mortality of 80 to 100% while corresponding tests with Mitin FF show a mortality of only 40 to 50%. While the rate of mortality differs between Eulan CN and Mitin FF, both protect about to the same degree. This means that Mitin exhibits also a certain repellency for carpet beetles, otherwise the weight of the excrement for the Mitin tests would be higher than for Eulan CN.

We do not have an explanation for the action of Eulan CN, but the accumulation of chlorine must play a part in the efficiency of these triphenyl-methanes since a product of formula (Fig. 6), which differs

* Presented at Non-Cellulosic Fibers Group Meeting, Robert C. Anderson, Presiding, Chicago National Convention, October 24, 1947.

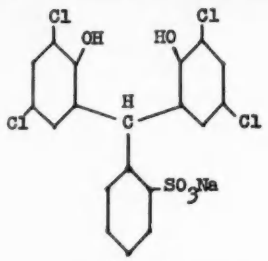

Figure 6.

from Eulan CN in only one chlorine, is about half as efficient as Eulan CN.

Although Laeuger, Martin and Mueller have shown that the position of the chlorine is of importance in many cases and that in some cases an additional chlorine might even decrease the efficiency, we know that an accumulation can also increase the efficiency many fold as is not only shown with formulae 5 and 6, but also in the higher effectiveness of DDT as against Preventol GD, formulae 1 and 2, especially if we consider that p-dichlorodiphenyl-methane (Fig. 7) was reported to

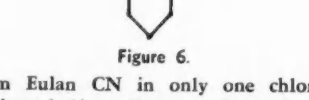

Figure 7.

be ineffective. In an attempt to explain possible reasons for repellency, we have to consider the chemical constitution of the wool. The digestive ferment of the keratin eaters, especially the larva of the clothes moth, is specific for the sulfur linkage (Fig. 8). Silk which does not contain

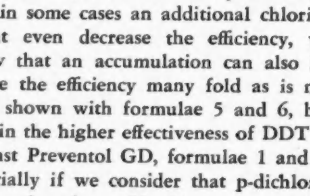

Figure 8.

this sulfur linkage, but otherwise is chemically similar to wool is not digested by larvae. Therefore, wool modified by Milton Harris (Fig. 9) shows a resistance to

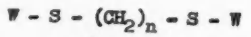

Figure 9.

moth attack. The degree of resistance seems to be in proportion to the amount of

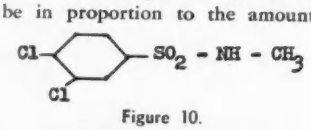

Figure 10.

broken linkages. Formula (Fig. 10) dichloro-benzene-sulfon-methylamide, represents the effective mothproofing agent Eulan BL. p-Chloro-benzene-sulfonamide (Fig.

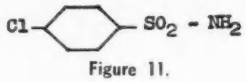

Figure 11.

11), corresponds to p-amino-benzene-sulfonamide, (Fig. 12), the sulfanilamide

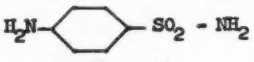

Figure 12.

of Domagh, which is the original sulfa drug used in the chemotherapy of bacterial infection. Therefore, we can assume that Eulan BL acts on the digestive ferment of the moth larva in a similar way as the sulfa drugs on the bacteria of the human body. Hence, wool treated with Eulan BL will inhibit the action of the digestive ferment of the keratin eaters. Because it is indigestable, the wool will be protected.

Eulan NK is a quaternary phosphonium compound, dichloro-benzyl-triphenyl phosphonium chloride with the constitution of the formula shown in Figure 13. This

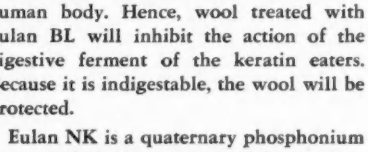

Figure 13.

cation active product reacts with the anionic digestive ferment and blocks its action. The end result is similar to the protection obtained with Eulan BL. This also explains why wool treated with Eulan NK is sometimes less damaged than wool containing Eulan CN. For the carpet beetles, Eulan NK is a repellent while Eulan CN is a poison, and they have to eat the poison before they die.

It would be logical to assume that cationic products of high germicidal potency might possess mothproofing qualities. We found that this is really so with a product which is on the market under the name of Bional A, an alkyl-dimethyl-benzyl-ammonium-chloride of the formula shown in Figure 14 where R represents

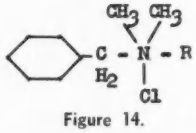

Figure 14.

alkyl radicals ranging from C_8H_{17} to $C_{18}H_{37}$.

Going back to the effect Harris' modification of wool has on mothproofing and considering that on exposure to light we always have a certain destruction of sulfur-linkages, we made an observation which is of theoretical interest. We ran incubator tests with light exposed wool and found that on several occasions a long exposure in the Fadeometer actually renders wool partially mothproofed, i.e. the exposed part is protected. Exactly the same result was obtained when woolen flannel was exposed to sunlight. The exposed side of the flannel was protected while the unexposed part was attacked. To make sure that this was no accident the flannel was pasted on cardboard once with the exposed side up, and once with the exposed side down. It was very amusing to see that the samples which were pasted with the exposed side up were only attacked along the edge where the wool was cut, while the samples with the unexposed side up were attacked all over. This holds true for the webbing clothes moth as well as the carpet beetle.

The diagram explains this. Figure 15

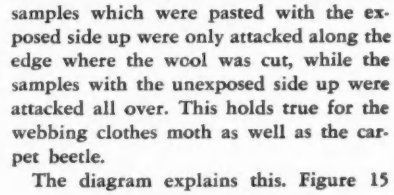

Figure 15.

shows the wool attached to cardboard with the exposed side up. The attack was only as indicated by the arrows, namely, from the cut edge. When the exposed side was pasted down (Fig. 16) the surface

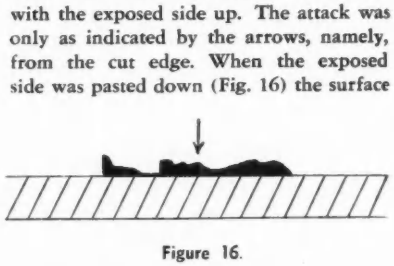

Figure 16.

was attacked everywhere.

The relation of light exposed or tippy wool and chlorinated wool suggested that chlorination might make wool indigestable since here also sulfur-linkages are broken. The tests showed that a controlled chlorination does not give protection, but with an over-chlorination, using 10-15% active chlorine on the weight of the wool, the amount of excrement was reduced from 19 to 6.5 mg with carpet beetles and with the webbing clothes moth the destruction was very small on the over-chlorinated material as compared with the blank. With the help of the moth and carpet beetle, strong evidence is brought herewith in support of the hypothesis that there is a relation between light exposed or tippy wool and chlorinated wool. While these findings are very interesting they are, of course, only of academic value.

It has not been established whether this partial protection is only due to the destruction of sulfur-linkages or whether also the formation of a repellent within the wool is responsible. We always must consider that the keratin eaters can also digest casein which means that the action of the digestive ferment is not entirely limited to an attack on the sulfur-linkage.

A satisfactory explanation for this has not been given.

II–Physiological

(Note: The physiological part was explained with 40 colored slides. A general description of these slides follows. Only a few illustrations are shown herewith in black and white through the courtesy of the Textile Research Institute, Inc.)

We know three types of tineids of which the *Tineola Biselliella Hummel*, the webbing clothes moth, is the major textile pest. The life cycle of the moth is as follows: The miller produces eggs. Out of the egg emerges the larva, the larva forms a chrysalis and out of the pupa emerges the miller or adult.

The adult moth is the only sexed form in the life cycle. The females are considerably larger than the males, reaching a length of 9 mm., while the males grow up to 7.5 mm. Males live up to 56 days, females only 16 days. The miller does not eat at all and lives entirely on reserves stored during the larva stage. The only task of the miller is the propagation of the species.

If a miller flies voluntarily it is a male. The female is too heavy to fly and undertakes flight usually only after depositing eggs. The moths can creep into the narrowest folds and cracks in which they hide and copulate. Therefore, moth infested wool usually shows many parts of the adults, like scales or legs.

The egg has a length of 500-700 microns and weighs about 0.026 mg. The time of development is 7-12 days. The newly born larva weighs about 0.03 mg. A fully developed larva weighs 7.7 mg. nearly 300 times more than an egg. This tremendous increase in weight is a good indication of the amount of damage done to woolen materials. According to Titschack, one clothes moth with descendants of four generations eat 40-90 lbs. of wool.

The body color of the young larva is white. The first coloration appears at the biting jaws as the self color of the chitin. Sometimes, the colored contents of the intestine are visible because of transparency of the body.

Figure 1 shows a larva in typical eating position. The larva has no eyes. The growth and development depends upon the temperature and the food. Its life time is about 300 days with an eating period of about 250 days. During this time the skin may be shed 17 times. The body skin is usually cast off first and then the head chitin.

Figure 2 shows a larva with the head chitin just after it was cast off. Figure 2a shows the head of a larva detached from the body. The head is smaller than the head of a pin. Left and right from the wedge-shaped middle part are the lateral hemispheres. In front of these (above in the picture) are the dark brown mandibles, the biting jaws with 5 cutting teeth each arranged similarly to the fingers on the palm of a hand. The mandibles are triangular and hollow and are fastened to the cranium by ball and socket hinges. Nature's building method is interesting, using the principle of angle beams to build this important organ as light and as strong as possible By moving the mandibles together a wool fiber is clipped off.

Next to the mandibles, right and left, are the antennae. Visible between the mandibles—in reality under these—is the underlip organ, the submentum with the labium, the spinneret and right and left of the spinneret the maxillae, which move the fibers into position.

The larva spins immediately after leaving the egg. Spinning continues to the end. It is the last function to cease. Remuth, by separating and by irritating the head, was able to reel off 3 to 5 yards of silk thread with the help of micro-instruments. The silk thread spun by the larva serves a double purpose. The silk thread can be attached anywhere and enables the larva to move along any surface and together with any material available it is used in building a feeding tube and later a cocoon. While the larva of the webbing clothes moth eats it prefers to remain in the feeding tube. The tube is built of thin layers of silk, covered with pellets of frass and all fibers of the material on which the larva is feeding. Therefore, the tube takes on the same general color and thus is involuntarily camouflaged. Quite a few of the fibers which are bitten off are not eaten, but simply used for the feeding tube.

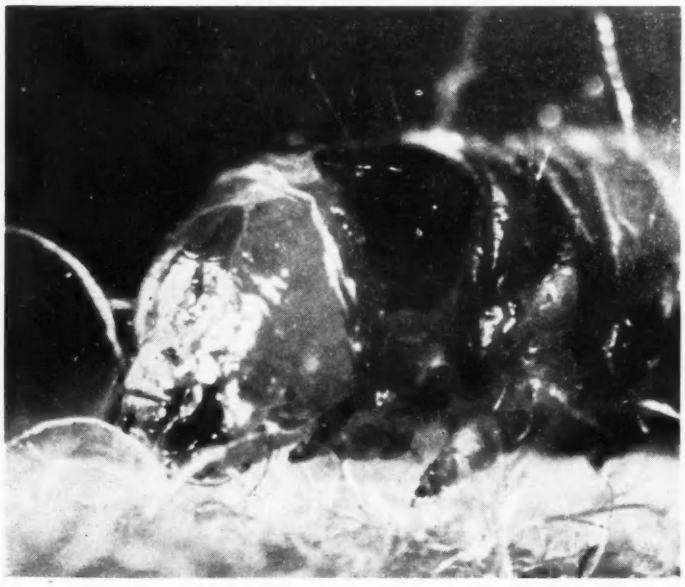

Figure 1. Larva in typical eating position (side view). The head is lowered, the lower jaw pushed into the nap; the mandibles are open and the upper lip is lifted.

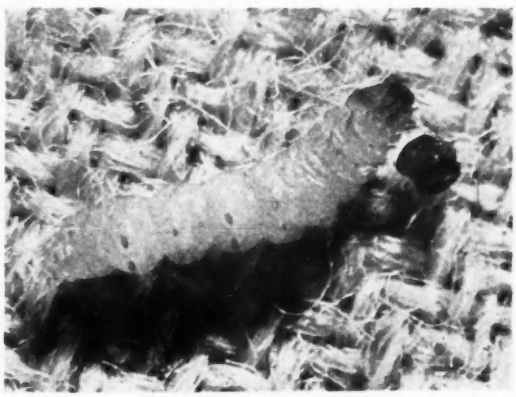

Figure 2. Larva with chitin head cast off.

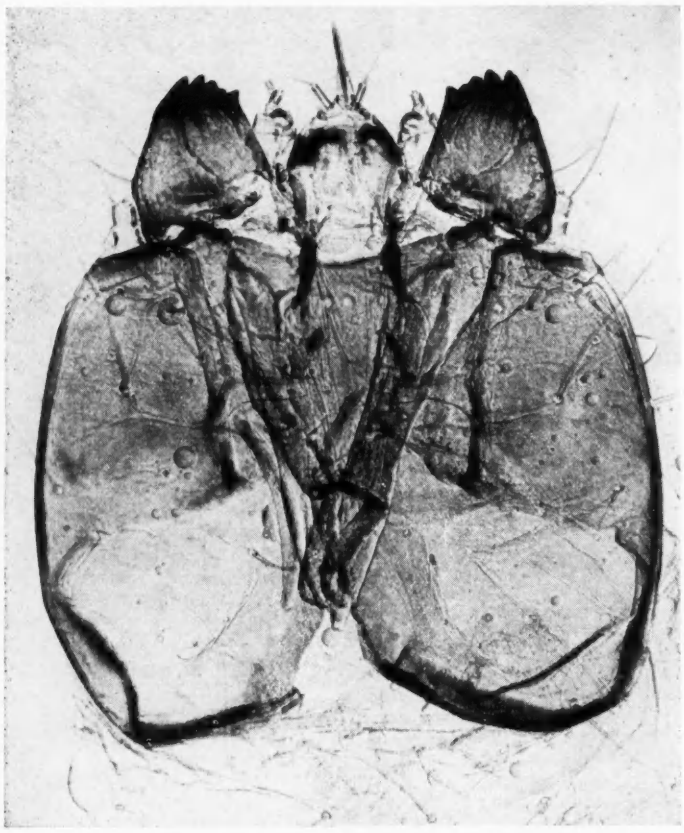

Figure 2a. Head of larva detached from body. Facial view. Left and right from the wedge-shaped middle part, the lateral hemispheres. In front of these (above in the photograph), the dark-brown mandibles; next to these, right and left, the antennae. Visible between the mandibles—in reality under these—the underlip organ, the submentum with the labium, the spinneret, and the maxillae.

Now we arrive at the question: What do larvae really eat? They attack not only wool, but also rayon, cotton, silk, etc., if these fibers are in mixtures with wool. While looking for food the larva destroys also the vegetable fiber. With decreasing amounts of wool the damage increases up to a certain point, as the larva, in an attempt to find food is forced to destroy large areas. However, if the wool is protected in such a mixture by Eulan CN, neither the wool nor the other fibers are eaten. On Eulan treated material, some of the larvae form a premature pupa to save themselves from complete destruction and to extend life into the next generation. For the cocoon, the larva takes anything. It is natural that in a case of emergency even mothproofed materials might be used for the building of the cocoon, and so it happens, that we observe sometimes shavings on treated materials.

After discussing what larvae destroy and eat, we must ask what they digest.

The distance between the two mandibles of young larvae reaches a maximum of

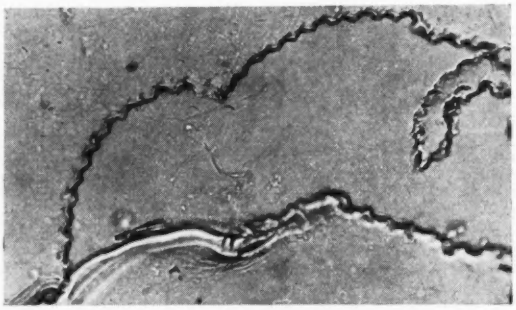

Figure 3. Cellophane wrapper eaten through by larva, showing the negative of the mandible profile.

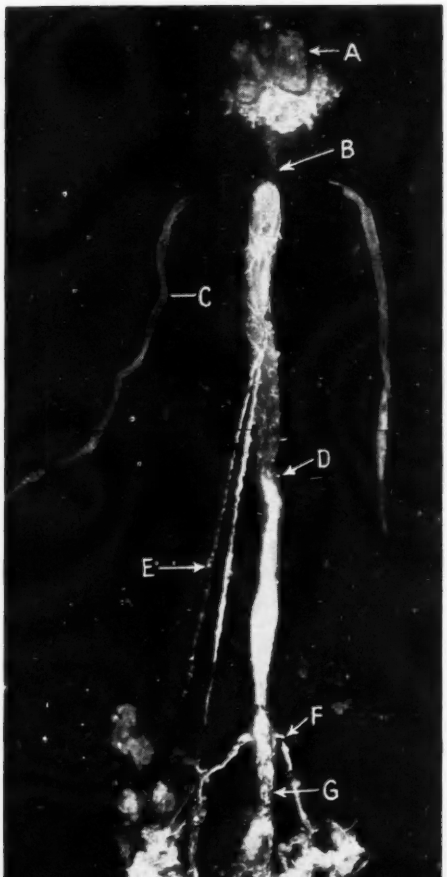

Figure 4. Anatomy of the abdominal canal of the moth larva, Tineola biselliella Hum. A—head; B—oesophagus; C—spinning glands; D—mid-intestine; E—water return vessels; F—junction of Malpighian tubules; G—end intestines; H—Malpighian vessels.

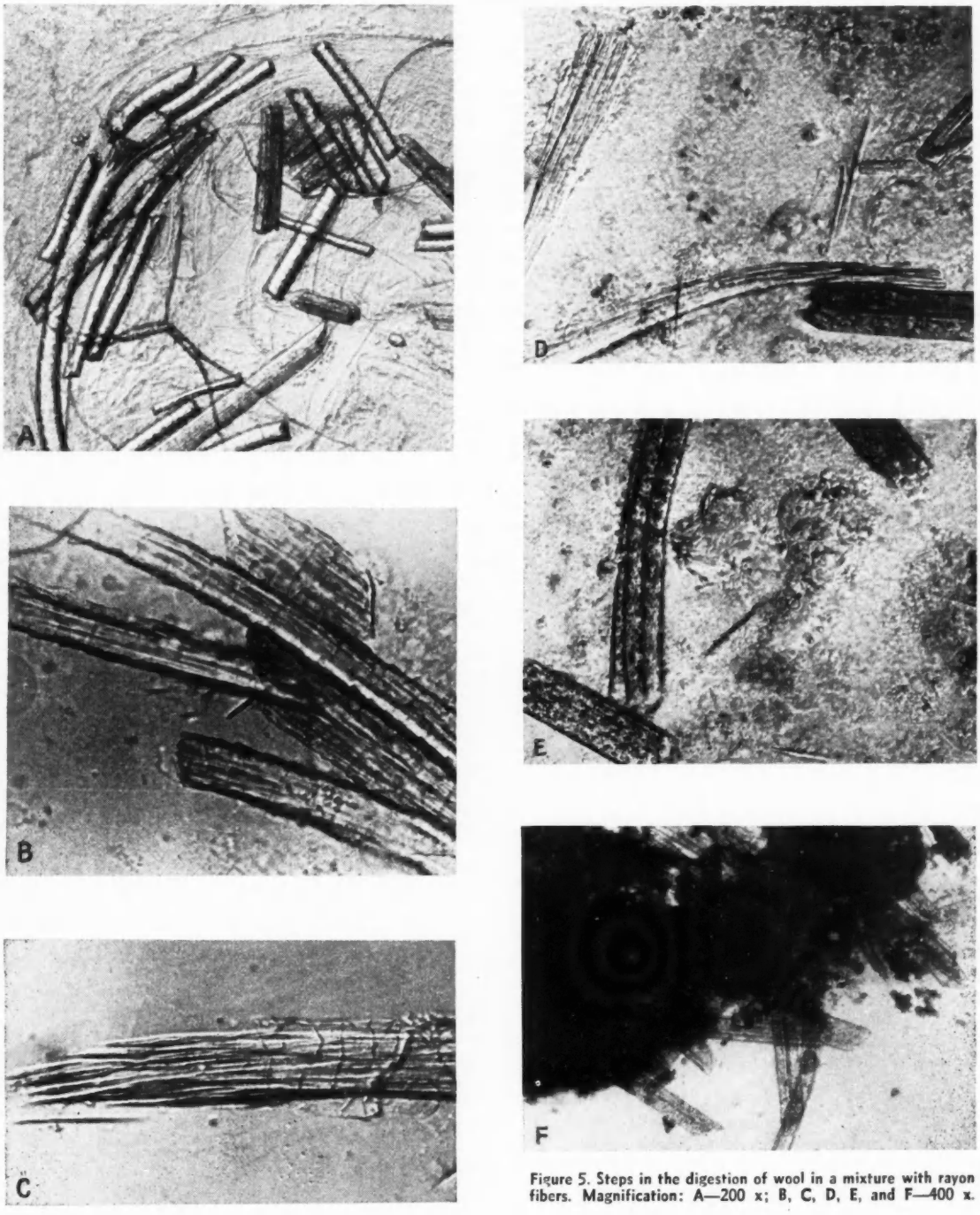

Figure 5. Steps in the digestion of wool in a mixture with rayon fibers. Magnification: A—200 x; B, C, D, E, and F—400 x.

90μ. This anatomical peculiarity explains why fine wools of a diameter of 11 to 50μ are attacked easier than hair with a diameter up to 250μ. The finer grades can be clipped off in one bite while thicker hairs have to be gnawed.

The mandible profile is often very nicely visible. Figure 3 shows a cellophane wrapper which was supposed to prevent larvae from eating wool, but was attacked and we have here a very distinct profile of the mandibles on the cellophane wrapper.

Figure 4 shows a complete picture of the anatomy of the larva.

When a larva is fed with wool dyed red with litmus, the red is visible in the upper part of the abdominal canal. In the middle part the wool dissolves and because the digestion takes place at a pH of about 9.5 the litmus changes to blue. In the lower part the litmus turns red again because ureic acid flows through the Malpighian tubules into the tract. The excrement is therefore red. Reumuth prepared specimens of this kind by making a careful separation of the skin of the

body from the head. Then he cut off the last sector; holding the head he pulled the abdominal canal out of the skin.

Figure 5A shows a mixture of wool and rayon which has just entered through the gullet. The length of the fibers is determined by the depth of the oral cavity. The digestive ferment starts working immediately by entering the cut off fibers from both ends (Fig. 5B).

The wool passes along and gets into the mid-intestine. Here we see a rapid disintegration. (Fig 5C) The wool fibers show longitudinal striations, that is, the enzymes of the alimentary canal have effected a loosening of the single fibrillae of the closely packed cell system. It is interesting to note that the dyestuff is reduced while the wool dissolves. The decomposition of the fibers in the short tract of the larva takes place much more thoroughly and much quicker than in the test tube. The digestion is almost complete in Figure 5D and as soon as all the wool is dissolved the wool dyestuff is reoxidized. The rayon is neither attacked nor is the direct dyestuff reduced. (Fig. 5E)

The excrement will have the color of the wool which was eaten. That means larvae producing red excrement on blue material could not have eaten from this blue material.

Figure 5F shows a pressed pellet of excrement free from wool. The pellet contains, besides many grains assumed to be ureic acid, the undigested delustered rayon.

When wool is treated with Eulan, the abdominal canal looks empty and collapsed. Attempts to render the Eulan wool tasty by odorizing it with solutions of putrified urine, liquid horse manure, solutions of rotten eggs, meat broth, etc. have been made. Only in a few cases did larvae attack odorized wool treated with Eulan. This was disappointing for the experiments, but it verified the effectiveness of Eulan as a mothproofing agent. Some pieces of 0.1 mm. length were found, but these showed no signs of disintegration by the fluids of the tract.

It was found that larvae which have eaten only traces of Eulan-treated wool suffer considerable disturbance of the intestines. In these intestines and especially in the Malpighian tubules, a premature precipitation of crystals appears which seem to choke up these organs.

Acknowledgment

The author wishes to thank Mrs. Winifred Pardey of General Dyestuff Corp. for the incubator tests with carpet beetles and Dr. G. Ferguson of Geigy Company for the tests with the clothes moth.

Pigmented Resin Emulsions—

(Continued from Page P46)

misleading results are sometimes obtained by using the standard AATCC tests. In other words, they don't seem to be really severe enough because of the fact that there isn't enough abrasion. What do you consider to be a good test of fastness on pigment dyed goods?

Mr. Silverman: Are you talking about washing?

Mr. Blum: Yes.

Mr. Silverman: I would say a good dash wheel wash—several of them. May be half a dozen dash wheel washes, at a boil, for three-quarters of an hour is a good test. I will caution you on this, though, that I have found, much to my surprise, that a good many people who have dyed with vat dyes for years have some sort of a conception that those wash perfectly, until they are given the same wash test as the pigment colors, and then they arrive at the conclusion that there isn't so much difference between the wash fastness of the two systems when pigments are properly applied.

Mr. Blum: I have found some pigment dyed goods to be equivalent to vats. I wondered what your experience has been.

Mr. Silverman: Yes, that has been our experience. Several times we have had occasion to go through that, because it was brought to our attention that pigment dyeings wash down. But a comparison with the vat dyed material indicates that generally speaking, pigment resin colors can be printed and dyed that wash, on the average, as well as the vat colors.

Mr. Creegan: Does speed of drying have any effect on migration, or can migration be controlled with speed of drying?

Mr. Silverman: I imagine that speed of drying might help to control migration. In other words, if you could set it quickly you would eliminate the chance for the color to go from one side of the cloth to the other. I would say that in can drying it is especially necessary to run at a good clip, because if you run your cans slowly and dry one side thoroughly on the first can before the other side hits the other can, you are apt to get in trouble.

Mr. Creegan: I was thinking more in terms of temperature and fast removal of water.

Mr. Silverman: We don't have any real facts on drying at various initial temperatures.

Mr. Redmond: This gentleman on my left asked a short time ago about the color value in printing a vat color as a pigment—using a vat color as a pigment or using it as a vat color—and you told him you thought you could get color value a little better with vats used as pigments. That doesn't hold with pad dyeing, does it?

Mr. Silverman: In our particular system, and we have just got through evaluating that, we have in most cases arrived at the same depth of shade with less color when used as a pigment.

Mr. Redmond: Can you get as strong shades, pigment dyeing, as when dyeing with vat colors, or are you limited?

Mr. Silverman: As I say, we are limited to medium to light shades. The deep shades, no.

Mr. Redmond: Is there a difference in color value in the deep shades, or is there some other reason for your not being able to make the heavy shades?

Mr. Silverman: The chief reason for not being able to make the heavy shades is that the other characteristics of a good dyeing go haywire with the pigment resin system, such as harshness, stiffness of hand, etc. I believe we could get the pigment necessary into the formula, but the results are not very satisfactory.

Mr. Nauman: How does mercerization affect the shade?

Mr. Silverman: We usually get brighter, stronger shades on mercerized cotton.

Mr. Nauman: If you dyed sherdye with the vat colors and then put it on a regular jig with caustic and hydro, what would happen?

Mr. Silverman: I don't know what would happen. Usually it is pretty difficult to reduce these vat colors used as pigments once they are dyed on with the resin. I don't think you would get a satisfactory reduction.

Mr. Broadbent: You wouldn't.

Mr. Silverman: They don't seem to be in the proper state for reduction.

Mr. Claflin: Haven't you found considerable difference in the pigment value of different vat dyes?

Mr. Silverman: I don't know how to answer that. Different shades can't be compared very well. Perhaps I don't understand your question.

Mr. Claflin: Certain vat dyes, in the paper industry, for example, seem to act very well as pigments, and other closely related vat dyes don't seem to work well.

Mr. Silverman: Mr. Hennessey, can you answer that?

Mr. Hennessey: I think it depends on the particle size of the pigment. When we use vat colors for tinting bleached goods, it all depends upon the size of the pigment. The vat colors are sold for that

purpose, the same as the ones that are sold for dyeing, and it is quite important to standardize each particular batch for tinting, because if the batch doesn't come out the same particle size, you get poor yield, redder shades, not the specific shade.

Mr. Silverman: It seems to me that the particle size of the color strongly affects its value as a pigment.

—♦ ♦—

Practical Experience in Vat Acid Dyeing

J. H. HENNESSEY
General Dyestuff Corp.

Note: The above paper was published in the December 29th issue. The discussion follows:

Discussion

Chairman Osha: Do we have any questions?

Mr. Nauman: In converting the acid leuco compound over to the sodium form, at which pH is it converted?

Mr. Hennessey: It starts to convert as soon as you reach the alkaline point, as soon as you get about 7.0 pH.

Mr. Nauman: Is there any difference in the rate of dyeing in the sodium leuco form at different pH's?

Mr. Hennessey: Yes, to some extent.

Mr. Nauman: That is, the higher the pH, the more rapid the dyeing?

Mr. Hennessey: Up to a certain point. You can increase the caustic soda to such an extent that you really impede the dyeing action.

Mr. Nauman: I mean essentially, then, from say 10 to 12, it increases with pH—or not necessarily?

Mr. Hennessey: Yes, but pH 10 is pretty low.

Mr. Nauman: I am just referring here to the use of vat acid, and then getting over into the low pH's.

Mr. Hennessey: You eventually have to go to 13 pH anyway, to dye level. You were probably thinking more in terms of package machine work than piece goods.

Mr. Nauman: No, I wasn't thinking of anything in particular. I was just wondering whether you could get it, as you say, essentially over 7.0 pH, and then it does begin to dye.

Mr. Hennessey: Yes. It begins immediately.

Mr. Nauman: Did you say you could dye in the acid leuco form or not?

Mr. Hennessey: Yes. Impregnation with the vat acid, followed by conversion to the Sodium Leuco.

Meeting, Mid-West Section

THE Winter Meeting of the Mid West Section was held at the Bismarck Hotel, Chicago, Illinois, December 13, 1947.

The afternoon meeting was called to order at 3 P.M. and was attended by 50 members and guests. This meeting consisted of an open forum discussion, at which time many interesting subjects were discussed. The meeting was adjourned at 4 P.M.

Dinner was served at 7:45 P.M. and 55 members and guests were present. The secretary's and treasurer's reports were read and approved. Elmer Smith submitted his final report on the National Convention, which, thanks to our many friends in the textile industry, was most successful.

The report of the Nominating Committee was then read by Elmer Smith, Chairman, recommending the following list of new officers. These were voted upon and approved by the members.

Chairman, Joseph H. Jones; *Vice-Chairman,* Elliott Morrill; *Treasurer,* Edward Larson; *Secretary,* William Boyd, Jr.; *Councilors:* Eric Camp and S. Klein; *Sectional Committee:* Al. J. Feit, Norman G. Koehler, Arthur I. Hultberg, and Louis Blank.

Our speaker of the evening was then introduced by the new chairman. Arthur H. Razee of The Rumford Chemical Works, Rumford, Rhode Island, gave a most interesting talk on "Textile Processing with Polyphosphates."

Before adjourning the motion was made, seconded, and approved that the secretary send flowers to George Osha. The meeting was then adjourned.

Respectfully submitted,
WILLIAM BOYD, JR., *Secretary*

—♦ ♦—

Membership Applications

SENIOR

William J. Barnes—Supervisor of Chemical Laboratory, Sidney Blumenthal & Co., Inc., Shelton, Conn. Sponsors: S. Vaniotes, H. H. Taylor.

Francis J. Buckley—Dyehouse Overseer, Hockmeyer Bros., Inc., Lowell, Mass. Sponsors: C. L. Howarth, C. A. Everett.

Kester Burrow—Dyer & Chemist, Geo. E. Sherman Co., Inc., High Point, N. C. Sponsors: R. H. Smith, C. H. Miller.

John C. Busby, Jr.—Inspection Officer, Naval Clothing Depot, Brooklyn, New York. Sponsors: L. S. Little, S. A. Pettus.

Alfred E. Brown—Chemist, Research Associate, Harris Research Laboratories, Washington, 11, D. C. Sponsors: M. Harris, W. E. Yelland.

Russell L. Brown—Prof. of Textiles, Lowell Textile Inst., Lowell, Mass. Sponsors: H. C. Chapin, E. Fickett.

John J. Connorton—Merchandise Manager, Wool & Synthetic Products, American Thread Co., New York City. Sponsors: F. W. Perry, L. F. Costello.

Joseph A. Clark—Chemist Assistant, Scholler Bros., Inc., Phila. Sponsors: L. O. Koons, C. A. Seibert.

Al Ralph Decesare—Supt. Finisher, Rainbow Finishing Corp., Port Chester, New York. Sponsors: W. T. Trezise, A. R. Jenny.

Tonny G. de Haan—Chemical Engineer, De Regenboog, N. V., Tilburg, Holland. Sponsors: W. E. P. Vanoordt, H. C. Krijgsman.

Edward J. Gom—Treasurer, Sterling Chemical Products Co., Inc., Middletown, Conn. Sponsors: G. McCall, R. C. Patton.

Carlyle Harmon, (Dr.)—Director of Research, Chicopee Mfg. Corp., Chicopee Falls, Massachusetts. Sponsors: S. A. Simon, W. J. Hamburger.

James R. Harris—Assistant Dyer, Wehadkee Yarn Mills, Talladega, Alabama. Sponsors: A. K. Haynes, J. M. Youngblood.

Joseph A. Kelly—Colorist, Baxter, Kelly, and Faust, Philadelphia, Pa. Sponsors: A. M. Gordon, W. O. Neeb.

Shankerlal K. Khandheria—Research Fellow and Research Assistant, Dept. of Chemical Technology, Bombay, India. Sponsors: W. D. Appel, K. S. Campbell.

George H. Klingberg—Manager Weaving Div. A. Wimpfheimer & Bro., Inc., Stonington, Conn. Sponsors: J. E. Lawton, R. W. Joerger.

Edwin J. Knott—Dyer, Jeffrey Finishing Co., Slocum, R. I. Sponsors: H. M. Gorton, Jr., W. B. Worsman.

Joseph E. LaFlamme—Overseer Dyeing & Finishing, Myrtle Knitting, Unionville, Conn. Sponsors: B. B. Meady, W. A. Lord.

Arthur W. Lanner—Textile Chemist, Procter & Gamble Co., Chemical Division, Cincinnati, Ohio. Sponsors: B. A. Ryberg, A. S. Davis.

Winthrop S. Lawrence—Research Director, Kaumagraph Co., Wilmington, Del.

Harvey W. Lindley—Dyer, Long Finishing Mills, Inc., Burlington, N. C. Sponsors: C. Hooper, W. L. Triplett.

Nathan A. Long—Sec. & Treas., Long Finishing Mills, Inc., Burlington, N. C. Sponsors: C. Hooper, W. L. Triplett.

William G. Luqueer—Sales-Demonstrator, General Dyestuff Corp., New York 14, N. Y. Sponsors: H. E. Hager, J. R. Bonnar.

Johannes G. A. Mulder—Director, Textile School, Holland. Sponsors: W. E.

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Louis S. Potsdamer—Partner-Director of Laboratory, Industrial By Products & Research Co., Phila., Pa. Sponsors: P. Theel, H. L. Eisen.

Marshall W. Ramsey—Technical Sales, R. T. Vanderbilt, New York, N. Y. Sponsors: G. E. Hopkins, A. C. Merrill, Jr.

Sutton Redfern—Head of Enzyme Unit, research chemist, The Fleischmann Laboratories, New York, N. Y. Sponsors: E. Valko, S. A. Simon.

George Rock—Finisher, Sayles Finishing Plants, Inc., Saylesville, Rhode Island. Sponsors: P. J. Ariente, H. C. Allen.

Johannes F. Roeloffzen—Technical Salesman, (Amersfoort), Alg. Amerikaanshe Kleurstofonderneming N. V. Sponsors: W. E. Vanoordt, H. C. Grijgsman.

Dominick Scialla—Secy-Treas. & General Manager, Artex Dyeing & Finishing Co., Inc., Paterson, N. J. Sponsors: L. J. Dogin, H. E. Kampf.

Ulf A. Serrander—Main-dyer, Almedahls-Dalsjofors Fabriks A. B., Goteborg, Sweden. Sponsors: S. Arnold, F. W. Hillman.

Edwin P. Sherman—Chemist, The Geo. E. Sherman Co., Inc., New York, N. Y. Sponsors: R. H. Smith, C. H. Miller.

Norman H. Sherow—Salesman, Laurel Soap Mfg. Co., Philadelphia, Pa. Sponsors: C. A. Heydon, R. J. DeWitt.

Murray S. Simon—Foreman, Darcy Studio of Textile Printing, Brooklyn, N. Y. Sponsors: H. V. Morrell, L. A. Blaisdell.

Pierce S. Smith—Supt. Bleaching & Mfg., Commander Mills, Inc., Sand Springs, Oklahoma. Sponsors: L. N. Hood, L. R. Fox.

Dr. George Thomson—Senior Research Associate, Fabric Research Laboratories, Inc., Boston, Mass. Sponsors: E. R. Kaswell, W. Hamburger.

Hyman Weiss—Plant Manager, Double Woven Corp., Dunmore, Pa. Sponsors: J. A. Shea, M. A. Noonan.

Joseph A. Whitney—Research Chemist, Perkins Soap Co., Springfield, Mass. Sponsors: H. M. Hartnett, W. M. Dewing.

Henry J. Wilkinson—General Superintendent, Bush Woolen Mills, Inc., Dresden, Ohio. Sponsors: L. C. Voss, F. F. Myers.

John R. Williams, Jr.—Technical Service, Calco Chemical Division, American Cyanamid Co., Charlotte, N. C. Sponsors: F. Pepper, S. J. Luscian.

Robert E. Wolfrom—Chemist, Textile Laboratory, Rohm & Haas Co., Philadelphia, Pa. Sponsors: A. C. Nuessle, D. W. Robinson.

JUNIOR

Richard F. Aurich—Chemical Engineer, Joseph Bancroft & Sons, Co., Wilmington, Del. Sponsors: A. L. Lippert, W. P. Hall.

Claude S. Clutz—Research Physicist, Forstmann Woolen Co., Passaic, N. J. Sponsors: H. C. Haller, W. von Bergen.

George H. Fine—Laboratory Assistant, Davis Screen Print Co., Fall River, Mass. Sponsors: R. H. Eaton, A. F. Bailey.

Theodore Fine—Cotton Converting Dept., L. W. Guild Co., Boston, Mass. Sponsors: W. E. Durgin, E. W Birdsall.

William J. Flanagan—Colorist—Laboratory, Ciba Co., Inc., Boston, Mass. Sponsors: C. L. Howarth, C. A. Everett.

Otto Gansert—Colorist, Joseph Bancroft & Sons, Co., Wilmington, Delaware. Sponsors: F. M. Ford, A. L. Lippert.

Leonard Hochstein — Chemist, Pilgrim Piece Dye Works, Brooklyn, New York. Sponsors: I. Peters, S. Schlenker.

James M. Leach—Research Chemist, Morton Chemical Co., Greensboro, N. C. Sponsors: J. R. Morton, H. H. Latham.

Virgil D. Lyon—Textile Chemist, E. I. DuPont de Nemours & Co., Deepwater, New Jersey. Sponsors: C. A. Seibert, P. L. Speakman.

Howard G. Mathews—Laboratory Assistant, Stevens Linen Associates, Inc., Webster, Mass. Sponsors: A. F. Fiddes, H. F. Kilguss.

Gordon A. Moos—Sales, The Geigy Company, Inc., N. Y. C. Sponsors: D. P. Knowland, H. C. Spatz.

Edward Pavlich—Textile Printer and Dye Mixer, Port Jervis, New York. Sponsors: H. F. Herrmann, H. E. Hager.

William J. Wyskoczka—App. Dyer, Merrimac Mfg. Co., Lowell, Mass. Sponsors: C. L. Howarth, C. A. Everett.

Applications for transfer to Senior Membership

Claude H. Allard, William R. Battersby, Preston H. David, James Falcon, Elizabeth K. Genger, Alfred E. Gervais, Mortimer Hacker, David O. Hamer, Jr., John Hilton, II, Milton Kramer, Arthur A. Margolin, Herman F. Metzler, Jr., Isidore Peters, Richard E. Rettew, Angus H. Roberts, Mary O. Shows, Safford P. Sweatt, Howard R. Walker, Jr., Charles P. Yih, Ernst Zerner.

ASSOCIATE

Kenneth G. Dustin—Salesman, Arnold, Hoffman & Co., Inc., Providence, R. I. Sponsors: E. D. McLeod, E. H. Arnold.

Irene H. Freed—Harry B. Brown Co., Los Angeles, Cal.

Chris W. Farrell—Salesman, Superior Color & Chemical Co., Inc., Paterson, N. J.

John J. Gillespie—Manager, The Tingue Mills, Inc., Seymour, Conn.

Staffan O. Gran—Textile Chemist, Drags Aktie Bolag, Norrkoping, Sweden.

Lars T. Jonsson—Dyer's Apprentice, A.B. Forendade Yllefabrikerna (YFA) Stenhasgatan 5, Atvidaberg, Sweden.

Robert B. Killingsworth—Chemist, Asst. Tech Director, Socony Vacuum Oil Co., Brooklyn, N. Y.

Bjorn Lockert—Chemical Engineer, A/S Special Impregnering Drammen, Norway.

George M. McNulty—Technical Sales & Mfg. Representative, Stanco Incorporated, Elizabeth, N. J.

Sidney McDermott—Head of Sales Dept., "Francolor" Dyes & Chemicals, Agencias Graham S. A. C. Santiago de Chile.

Gordon L. McClay—Supervisor of Washability Laboratory, Lever Bros., Toronto, Ont., Canada.

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

47-40

Education: B.S., Rensselaer Polytechnic Institute; M.A., Columbia.

Experience: Organic chemist, petroleum inspector in Army of U.S., dyehouse chemist, formulation and testing of textile specialties.

Age 35; married; references; position in northeast U.S. desired.

TRADE NOTES • NEW PRODUCTS

• New Film on Finishes

The importance to the consumer of the new functional finishes for textiles is stressed in the color film "It's All in The Finish," presented by the Textile Resin Department of the American Cyanamid Company.

The film depicts an average family and the difference the new fabric finishes make in their lives. Among the resin finishes related to the lives of ordinary people are Lanaset Resin for wool shrinkage control, Permel water and stain repellant for cottons, rayons and wools, Lacet Resin to control the shrinkage of lace curtains and to enable them to be washed and dried without the use of curtain stretchers, Sheerset Resin to give a highly durable stabilization and moisture-resistant crispness to all sheer fabrics and Superset Resin for lasting crease resistance and stabilization of rayons and other types of fibers.

While the consumer point of view is stressed, also shown is the mill applicatin process of the resins to fabrics.

The movie will be shown to executives of textile mills throughout the country and is scheduled to be shown later to department stores and home economics groups.

The film was produced by Hamilton Wright Organization and narrated by Red Barber.

• Reduction in Bleaching Time

A 50% reduction in the time required to bleach knit goods in the Butterworth Continuous Bleaching System has just been announced. The saving is achieved by using a peroxide-silicate-caustic formula recently developed in the duPont laboratories. Instead of treating goods with caustic and later with peroxide, the two stages are combined in a single run.

The equipment for the Butterworth Bleaching Range for knit goods requires only 44 feet in the bleach house. It includes an impregnating machine, steaming tube, "J"-box, slack washer and squeezer.

It is stated that continuous bleaching of knit goods became practical early in 1947 with the development of tension controls for handling knit goods gently and efficiently. Special piling and tension devices in the new high speed Butterworth Slack Washer and special reels and piling mechanism in the streamlined Butterworth "J"-box are examples of controls of this type.

• Joins Maplewood Yarn Mills

Thomas E. Goulet, who has joined Maplewood Yarn Mills, Inc., Fall River, Mass., as superintendent of their new package dye plant.

The company has installed entirely modern equipment and will furnish dyed and natural yarns. They will also do commission yarn dyeing.

Mr. Goulet graduated from Northeastern University. He started in the laboratory of the Sayles Finishing Plants, has been superintendent of dyeing of the Atlantic Rayon Corporation and subsequently held the same position at the Woodlawn Finishing Co.

• AIC Medal Award

Dr. Charles Allen Thomas, executive vice president and technical director of Monsanto Chemical Company, St. Louis, Missouri has been unanimously selected to receive the 1948 gold medal of The American Institute of Chemists.

Dr. Foster D. Snell, president of the Institute, stated that the award is made in recognition, not only of Dr. Thomas' work in the development of atomic energy and his leadership in research, particularly in synthetic resins, but also for his administrative ability and his encouragement of basic research.

Presentation of the medal to Dr. Thomas will be made at the Annual Meeting of the Institute, to be held in New York, N. Y., on May 8, 1948.

During World War II, Dr. Thomas was one of the principal scientists in the development of the atomic bomb, having had charge of the final purification and metallurgy of plutonium, the 94th element.

In December, 1946, Dr. Thomas was elected President Elect of the American Chemical Society in nationwide balloting by approximately 50,000 members of the society, and took office January 1, 1948, as President for a one-year term.

In 1947 he was awarded the Industrial Research Institute Medal for outstanding achievement in the administration of industrial research.

• New Carbide and Carbon Office

To serve the growing chemical industry in Texas, Carbide and Carbon Chemicals Corporation has opened a new sales office at 1527 Esperson Building in Houston. Paul J. Doyle, Jr., has been appointed to take charge of the Houston office. Mr. Doyle has been associated with the Corporation since 1940 and has recently returned from service in the Army. He comes to Houston after a brief period at the Corporation's St. Louis office.

• Personnel Changes, Electrochemicals Dept.

Four major personnel changes in the Electrochemicals Department of the Du Pont Company were announced recently.

Donald O. Notman, who has been director of the Technical Division, becomes assistant general manager. He succeeds Samuel G. Baker who became general manager with the retirement of F. S. MacGregor after more than 30 years with the company.

Dr. E. A. Harding, who has been director of production, becomes director of the Technical Division, succeeding Mr. Notman.

Russel L. Hardy, manager of the Niagara Falls, N. Y., plant, becomes director of production, and Dr. N. C. Jones, assistant manager of the plant, succeeds Mr. Hardy.

• Manager of Technical Service

R. E. Sumner, Manager of American Cyanamid Company, Textile Resin Department, recently announced the appointment of Ralph M. Fischer, as Manager of Technical Service.

In his new position Mr. Fischer will supervise all field demonstrations in the New York, Philadelphia, and Chicago ter-

ritories, of resin and other new type finishes produced by the department. He will act as consultant in the New England and Southern areas. His duties will also include field work on New Products Development.

Mr. Fischer joined the American Cyanamid Company in 1939, following a twenty-year association with the United Piece Dye Works, Weidmann Division, where he held the post of Superintendent of Dyeing. Since 1943 he has specialized in resins for textile finishes from the technical sales standpoint throughout the Metropolitan and Southeastern territories.

He is a Charter Member of the New York Section of the American Association of Textile Chemists and Colorists, and a member of the American Association of Textile Technologists and the American Research Institute.

• Personnel Changes at Glasgo

The Glasgo Finishing Company, Glasgo, Connecticut, has announced the following changes in personnel as of January 1, 1948:

Loren Clark has been appointed colorist and replaces Louis Graichen. Mr. Clark was with Lawrence Print Works for a number of years.

Wilfred Hilton, night superintendent, has retired after a long and varied career in the textile industry.

Louis Graichen has been appointed night superintendent to replace Mr. Hilton.

• Monsanto Advertising Director

The appointment of Howard A. Marple as director of the newly created advertising department of Monsanto Chemical Company was announced recently by William M. Rand, president.

Mr. Marple, who has been with the company since 1937, served as editor of Monsanto Magazine for many years. He has been active in industrial publication circles and, since 1944, was manager of Monsanto's trade advertising.

R. Allan Gardner was appointed assistant director. Mr. Gardner has been with Monsanto since 1943.

• Heads Riegel Pilot Plant

The pilot plant at Riegel Development Laboratories, Inc., Ware Shoals, S. C. is now under the immediate direction of Jack Dawson Towery, a textile engineer with both mill and laboratory experience, John F. Warner, President, announced recently. A subsidiary of Riegel Textile Corporation, the development concern studies a variety of aspects of textile chemistry and production in elaborate and modern laboratory facilities.

The pilot plant makes tests of fabrics, fibers and yarns, and of weaving, finishing and fabricating processes. It makes other special tests and develops new techniques of production. It is the practical proving ground for the new developments produced in other divisions of the Riegel laboratories. Fabrics or processes, developed or tested successfully in the pilot plant, are then ready for full consideration at Riegel Textile Corporation's mills at Ware Shoals and Trion, Georgia.

Under Mr. Towery's direction, the pilot plant is currently conducting studies on special fibers, yarns and fabrics. Mr. Towery is directly responsible to Linton C. Reynolds, director of Riegel Development Laboratories at Ware Shoals.

Mr. Towery is a registered professional engineer and a member of the British Textile Institute, The Fiber Society, American Association of Mechanical Engineers, American Association of Textile Chemists and Colorists and American Association of Textile Technologists.

• Laboratory Centrifuge

Just announced by the Gerin Corporation of Red Bank, N. J., is the heavy duty hand power centrifuge shown above, which is designed to swing two or four 100 cc. tubes with minimum effort.

The unusual features are said to include ball bearings throughout, and a 24-to-1 gear ratio, permitting reduced crank speed. The outer diameter of swing is 16 inches and there is a stationary guard bowl to reduce resistance and protect the operator from whirling parts. The entire unit can be stowed in the bowl when not in use.

Further information is available from The Gerin Corporation, P. O. Drawer 653, Red Bank, N. J.

• Dr. Sisson Cited

Dr. Wayne A. Sisson, of the chemical research department of American Viscose Corporation, at Marcus Hook, Pa., has been cited as one of the "ten ablest chemists and chemical engineers" in the cellulose field. The *Chemical Bulletin,* published by the Chicago section of the American Chemical Society, called the roll in its November issue of the "ten ablest" in each of twenty specialized fields.

Dr. Sisson's principal work has been in the relationship of molecular structures to fiber properties, in both cotton and rayon. He developed a new scientific method for grading cotton for the United States Department of Agriculture, then for five years watched how nature builds cotton fibers at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y. From Boyce Thompson he went to American Viscose Corporation in 1940.

The American Association for the Advancement of Science honored Dr. Sisson this year by making him chairman of its textile conference, held in July at Colby Junior College, New London, N. H. He is the author of more than thirty technical articles, including the chapter on "X-Ray Examination of Cellulose Fibers" in "Cellulose and Its Derivatives", edited by Emil Ott.

• Monsanto Transfers

The Organic Chemicals Division sales department of Monsanto Chemical Company announced recently the transfers of two staff members.

Claiborne L. Barber will be transferred from sales contacts in the St. Louis area to the Organic Division sales office in Houston, Tex. Howard L. Armstrong also will be transferred from the St. Louis area to the company's Merrimac Division at Everett, Mass. Armin L. Klemm will replace Mr. Barber in the St. Louis area, and Mr. Armstrong will be succeeded by Rogers W. Malone, Jr.

• Water Demineralization Film

A new 16 mm. sound film in color, entitled "Water, Water Everywhere" has just been produced by the Ion Exchange Products Department of American Cyanamid Company.

It is stated that, since its development in the late thirties, the ion-exchange process has become increasingly important as a means of producing the low-cost chemical equivalent of distilled water. The film is devoted to an explanation of what ion-exchange resins are, how they work, and what advantages demineralization by ion-

exchange offers in various industries. The principles of ion-exchange are illustrated by animated drawings; batches of the ion-exchange resins manufactured by the company are followed through research, pilot-plant, and commercial-scale production; various demineralizers are shown in operation; and the uses for demineralized water in a number of industries are illustrated. The film runs for twenty-three minutes.

Prints of the film are available without charge or obligation for showing before meetings of industrial staffs, technical societies, and university students. Requests should be addressed to American Cyanamid Company, Ion Exchange Products Department, 30 Rockefeller Plaza, New York 20, N. Y.

• Color Microscopy Process

A new microscopy technique, developed by Germain C. Crossmon, Bausch & Lomb Optical Company scientist, is said to provide a speedier, more accurate identification of a wide range of colorless, transparent substances, including drugs and minerals.

In a talk delivered in Chicago on December 30th before the Zoological Section of the American Association for the Advancement of Science, Mr. Crossmon termed the technique "dispersion staining" and showed color photographs of thin sections of body tissue in which muscle fiber, blood vessels and fatty tissues appeared in bright contrasting colors.

Mr. Crossmon demonstrated that only standard microscope equipment is required to turn transparent, colorless objects to bright colors. By choice of the correct immersion liquid which is placed over the sample, each different material appeared a different color. He further illustrated his technique with photographs of textile fibers, grains of glass and mixtures of minerals. In each case, particles of different composition were different in color.

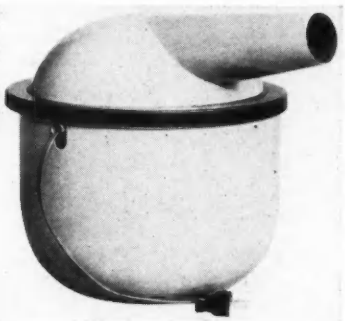
The light from the microscope lamp is passed through a dark-field substage lens to strike the sample at a high angle. The sample is covered with a high dispersion liquid that matches the light-bending ability of different materials in the sample at different portions of the color spectrum.

Each material then scatters some of the colors present in the white light into the microscope where they are seen by the observer while other colors pass directly through the sample at such a high angle that they do not enter the microscope.

Use of dyes to stain tissues or bacteria probably will not be supplanted, Mr. Crossmon related, in those cases where absorption of the dye is a specific chemical identification of the material.

In all of the many cases where a mixture of transparent materials is to be studied with a microscope, the color contrast produced by "dispersion staining" is expected to make the work of the microscopist less arduous.

• Laboratory Humidifier



A humidifier for testing laboratories and small storage roms, called the Standard Walton Humidifier, is shown above. Vaporizing one and a half pints of water per hour, this unit has plumbing outlets which allow the intake of water to be controlled automatically. Electrical consumption is approximately 25 watts. It is produced by the Walton Laboratories, Inc., 1186 Grove Street, Irvington, New Jersey.

• Textile Institute Diplomas

Several of the Diplomas awarded this year by the Textile Institute (16, St. Mary's Parsonage, Manchester, England) have gone to members in North America. The Fellowship Diploma (F.T.I.) which is granted to those who have made a substantial contribution to the advancement of knowledge relating to the textile industry, has been awarded to:

WERNER VON BERGEN, who served in the European Theatre of War as a scientific consultant to the U. S. Army, and is at present Director of Research and Laboratories at the Forstmann Woolen Co., Passaic, N. J.

DR. B. R. ROBERTS, Ph.D., formerly Professor at Instenbul University, and now Group Leader at Monsanto Chemical Co., Drayton, Ohio.

GORDON OSBORNE, M.Sc., a graduate of the Lowell Textile Institute and Harvard University, who is now Treasurer of Jefferson Mills, Inc.

The recipients of the Associateship Diploma, (A.T.I.) which is granted to those who have proved qualifications and experience in the textile industry, are:

COLIN H. BAYLEY, M.B.E., M.A.Sc., M.A., officer in charge of the Textile Research Laboratories of the National Research Council of Canada at Ottawa. For work on research and development of Army equipment and clothing, and other contributions in the textile field during the War, he was awarded the M.B.E.

MOJZEN HERZ GUTMAN, a pre-war student at Leeds University (England). In his native Poland he was in charge of raw materials at a factory at Lodz. During the war he served in the Polish Forces and then returned to Leeds University as a full-time student before going to America. He is now Manager of the textile department at the Downing Trading Corp., New York.

RICHARD THOMAS KROPF, B.Sc., now Director of Research at Belding Heminway Corticelli. He is outstanding in the field of thread research in the U.S.A. and was a member of a mission to survey results of research in Germany.

• du Pont Promotions

The Du Pont Company announced recently promotion of Harry F. Brown to general manager of its Explosives Department and Samuel G. Baker to general manager of its Electrochemicals Department. Both men have been assistant general managers of the departments they now head, effective January 1.

Mr. Brown succeeds William H. Ward who was elected a vice president of the company recently and Mr. Baker succeeds F. S. MacGregor whose retirement after a successful career of 31 years was also announced.

• Proxol Wool Oil

Procter & Gamble has announced the availability of Proxol, their new wool oil, after more than five years of research, development and plant scale operation.

It is stated that Proxol has been scientifically prepared to satisfy the demands of the picker, the carder, the spinner, the knitter or weaver as well as the wet finisher and dyer. Proxol is described by Proctor & Gamble as a "multi-quality" lubricant having many unusual advantages over other wool oils.

A new booklet describes the simplicity with which Proxol emulsions can be prepared, the small emulsion particle size and great emulsion stability. Proxol's spreading, anti-static and non-corrosive characteristics are also discussed. The booklet claims that Proxol does not oxidize during storage in the cloth to ultimately cause

poor scouring, streaks, blotches and undesirable odors. The bulletin also points out Proxol's ease of scouring with only a small percentage of the soap and alkali normally required to remove most wool oils.

Sales of Proxol and other products for the textile industries are being handled through Procter & Gamble's recently enlarged Textile Division.

A copy of the Proxol bulletin can be obtained by writing to: Procter & Gamble, Bulk Soap Department, Textile Division, P. O. Box 599, Cincinnati 1, Ohio.

• Charles Lennig Firm to be Dissolved

One of the oldest names in the chemical industry passed into history recently with the announcement by Rohm & Haas Company that its associate firm, Charles Lennig & Company, Inc., is being dissolved as a separate corporation, the business to be continued without change under the name of the Lennig Division of the Rohm & Haas Company.

Beginning as a chemical importing firm in Philadelphia in 1819, Charles Lennig manufacturing operations started with the production of sulfuric acid, and soon expanded to include other heavy chemicals, notably alum.

Rohm & Haas acquired control of the Lennig Company in 1920 when the plant was sold to settle the estate of John B. Lennig, grandson of the founder. As an associate firm, the Lennig Company continued to manufacture heavy chemicals, improving both its processes and its products through the instituting of a modern research program. New chemicals, notably the methylamines, were added to the line.

Transfer of the business operations of the Lennig Company to Rohm & Haas will not change policies or personnel, either externally or internally, it was announced by S. C. Kelton, Secretary. The chemical products now being manufactured and sold under the Lennig name will continue to be available from the Lennig Division of Rohm & Haas.

• Memorial Textile Fellowships

A trust fund of $50,000 has been set up by the Board of Trustees of the Habersham Mills Foundation of Georgia to create at the Georgia School of Technology the T. Earl Stribling Memorial Textile Fellowships, it was announced by Dr. R. L. Sweigert, Acting Dean of the Georgia Tech Graduate Division.

Income realized from the fund will be utilized to provide an annual graduate fellowship of $1500. Any balance remaining will be carried to succeeding years until $750 or more is accumulated, at which time an additional fellowship for one year will be provided.

According to the conditions of the trust agreement, the fellowship shall be made preferably to a native Georgian but may be given to others if a qualified Georgian is not available. Recognizing the broad interests of the textile industry, the trustees have stated that although the graduate research work of the recipient shall be done in the Textile Engineering Department under its supervision, a master's degree may be awarded in textile engineering, mechanical engineering, chemical engineering or chemistry. The successful applicant will be selected by the Textile Engineering Department faculty with the approval of the Graduate Awards Committee and, in the case of those desiring a degree in other than textile engineering, with the recommendation of the interested department.

• 120-Inch Padder

One of the largest padders ever built, according to the Rodney Hunt Machine Co., Orange, Massachusetts, is the "Wring-Master" unit pictured above. The 120-inch face width of the roller is said to be unusual in its capacity and ability to pad wide sheets; a notable factor in maintaining peak production. It is stated that effortless finger-tip control of pressures up to 15 tons is provided by the patented "Wring-Master" method of squeeze roll construction. The manufacturers offer many different "Wring-Master" units, in a wide range of sizes to meet any squeeze roll requirement. Write direct to the Rodney Hunt Machine Co., Textile Machinery Division, Orange, Massachusetts, for Bulletin No. 945, which illustrates and describes a complete line of "Wring-Master" Squeezers.

• Monsanto Transfer

Monsanto Chemical Company recently announced the transfer of James P. Mahoney from the company's Merrimac Division at Everett, Mass., to the Organic Division sales office in Chicago, where he will be in charge of Merrimac Division sales and sales development.

Mr. Mahoney, whose transfer was effectve December 1, replaces Ralph F. Nelson, who recently resigned.

• Meeting, Council of Laboratories

The winter meeting of the American Council of Commercial Laboratories was held in Washington, D. C., on December 8 and 9. The Council was the guest of the National Bureau of Standards and the meetings were held in the Director's Conference Room at the Bureau.

The importance of this meeting was attributed to the fact that it brought to the attention of scientists and government officials in Washington, the purpose and function of this important group of laboratories affiliated as the American Council of Commercial Laboratories.

The A.C.C.L., consisting of thirty-seven leading independent research and testing laboratories in the country, after a thorough discussion of the national interest in scientific research, adopted the following resolution:

> "Independent laboratories favor college fundamental research for the advancement of science, but deplore diversion of research in educational institutions from this high purpose to service of commercial interests. They hold that results of scientific work done by tax-favored organizations whose facilities are acquired at the expense of tax receipts should be dedicated to the public and should be published as promptly as practicable."

The A.C.C.L. was host to over one hundred important personalities active in scientific affairs in Washington. Representatives from the White House, Members of Congress, Department of the Treasury, Department of War, Department of the Navy, Department of Commerce, Department of Agriculture, National Advisory Committee for Aeronautics, Reconstruction Finance Corp., and Joint Committee on Internal Revenue Taxation were present.

A short address by Hon. William F. Knowland, Senator from California, Member of the Atomic Energy Committee, was heard.

The principal speaker and Guest of Honor was Dr. E. U. Condon, Director of the National Bureau of Standards. Dr. Condon's speech, "Science and the National Welfare", presented problems arising within the sciences themselves, and referred to The Steelman Report, "Science

and Public Policy." Research in the "humane" sciences was touched upon. It was said that in the "humane" sciences, the variables to be accounted for are vastly greater than those dealt with in the physical sciences, but this is not adequate reason for belittling the "humane" sciences and denying them support.

Dr. Condon also said that over-confidence is one of the dangers facing us at present. The United States has led the world in technological progressiveness and in the techniques of mass production we are without question, the most powerful nation in the world and in these facts lies the essential danger, for over-confidence is a product of precisely this set of circumstances.

At the Council Meeting, the following were elected officers of the A.C.C.L. for the year 1948:

President—Bernard L. Oser.
Vice President—Gustavus J. Esselen.
Vice President—Roger W. Truesdail.
Secretary—Daniel E. Douty.
Treasurer—Alvin C. Purdy.

• American-Ingraham Agitator Bulletin

A new bulletin illustrating and describing the unique American-Ingraham Agitator for mixing of heavy liquids shipped in drums has just been published. This bulletin points out the five outstanding features of the American-Ingraham Agitator and contains simple instructions on how to insert or remove the agitator from the drum to make cleaning and re-use easy. Copies are available from The American Pulley Company, Philadelphia 29, Pa.

• Chairman, Division of Cellulose Chemistry

Dr. Charles R. Fordyce, superintendent of the manufacturing experiments department of the Eastman Kodak Company, Rochester, N. Y., has been elected chairman of the Division of Cellulose Chemistry of the American Chemical Society. Dr. Fordyce succeeds Dr. Milton Harris, head of the Harris Research Laboratories, Washington, D. C.

Other officers chosen by the Division are: Dr. Rollin F. Conaway of E. I. du Pont de Nemours and Company, Waynesboro, Va., vice-chairman, and John S. Tinsley of the Hercules Powder Company, Wilmington, Del., secretary - treasurer. Named to the Division's executive committee were: Dr. A. G. Scroggie of the Du Pont company's Richmond, Va. plant and Dr. Wayne A. Sisson of the American Viscose Corporation, Marcus Hook, Pa.

• To Head Dyestuff Department Sales and Production

Interchemical Corporation—Textile Colors Division announces the appointment of Fred Baumann as Sales Manager and John Zelek as Plant Manager of its Dyestuff Department. Mr. Baumann joined the Textile Colors Division (then Aridye Corporation) in 1938 as a technical representative and later transferred to dyestuff sales. Previously, he had been general superintendent of Susquehanna Mills, Sunbury Division, and prior to that had engaged in the textile dyeing and printing industry in different capacities.

Fred Baumann

John Zelek

Before he joined the Textile Colors Division in 1945 as head of dyestuff research and development, Mr. Zelek was with Chemical Manufacturing Company. From 1938 to 1943 he was with Calco Chemical Division, American Cyanamid Company, and before that with Amalgamated Dyestuff & Chemical Works.

• War Plant Conversion

Six firms in the textile field are among 15 concerns jointly operating the gigantic Wright Aeronautical Corp. Fair Lawn, N. J. war plant in the first co-operative "small business" project of its kind, it was announced recently by N. J. Leigh, president of Fair Lawn Industries and chairman of the board, Einson-Freeman, lithographers.

The 6 textile concerns sharing possession of the 43-acre plant and its water, steam and electricity are Applikon, Inc., finishers and dyers, Tex Chem. Co., textile chemicals, Renco Finishing Co., Fair Lawn Finishing Co., and Normandy Finishing Co., finishing and dyeing, and Cedar Cliff Weaving Co., rayon weavers.

Einson-Freeman is one of the five owners which acquired the plant from War Assets Administration for $1,138-186. It owns two-thirds of the property which was 616,000 feet of factory space in 11 of 30 buildings spread over the 43-acre tract.

Tex Chem and Applikon are co-owners. Renco, Fair Lawn, Normandy and Cedar Cliff are tenants.

Fair Lawn Industries, Inc., composed of the five owners, manages the property and operates the plant's public utility services.

• Q. M. Sample Display Room

The New York Quartermaster Purchasing Office, 111 East 16th Street, New York City, has opened a new Sample Display Room as part of its recently accelerated industrial mobilization program, according to an announcement by Colonel L. O. Grice, Commanding Officer.

The exhibit, the first of its kind, emphasizes closer cooperation between Government and industry in providing for mflitary cooperation between Government and industry in providing for military requirements. It has been planned and arranged to supply the latest information available covering Quartermaster items for current procurement and will also assist in procurement planning with regard to commodities required by the Army and Navy for future use.

Opening ceremonies held on Friday, 21 November, were attended by Major General Thomas B. Larkin, the Quartermaster General; Brigadier General William H. Middleswart, Chief of Military Planning Division; Kellogg G. Birdseye, newly elected president of the Quartermaster Association; and a number of the nation's leading industrialists.

According to Colonel Grice, the Sample Display Room was developed by the Army in response to a long felt need "to demonstrate what the military services require to contractors who undertake the responsibility of producing and supplying items to meet those requirements."

Among the major displays are those relating to clothing and equipment used in

tropical, arctic and temperate climates; footwear of all kinds, including those worn by allied and enemy soldiers; production and inspection of textiles; and subsistence. A section devoted to Quartermaster research and development activities illustrates the extensive experiments being conducted in connection with water-repellent materials, fungi on articles of clothing, methods of shrinkage of woolen goods, and the use of fibrous glass for insulation linings for clothing to protect against extremes of temperature.

The Sample Display Room will be utilized for training purposes both for the installation's military and civilian personnel as well as for other components of the armed forces, and the training of Quartermaster Corps Reserve Officers. The facilities will be used further in cooperation with research and industrial programs outside the installation, as well as for purposes of special reference relating to procurement activities in general.

Colonel Grice has extended invitations to the armed forces, industry and the general public to visit and inspect the displays. The Exhibit is open daily between 9 and 5 o'clock.

• New Division, U. S. Testing

The Blair Laboratory of 143 West 20th Street, New York City, Analytical and Consulting Chemists to the Leather and Tanning Extract Industries, will become a division of the United States Testing Company in Hoboken, New Jersey, January 1, 1948. There will be a complete transfer of the testing facilities of the Blair Laboratory to the United States Testing Company plant in Hoboken. All the staff of the Blair Laboratory will be retained. C. A. Blair will be Manager of The Blair Laboratory Division of the United States Testing Company.

• Gurley Open House

On December 16th the families of 237 employees of W. & L. Gurley, Troy, N. Y., attended a "See-Us-At-Work" open house day marked by tours of the plant while it was in full operation and an exhibit of the company's products. These products, numbering 68 in all, included engineering and surveying instruments, hydraulic engineering instruments, standard precision weights and measures, paper and textile testing instruments, aeronautical navigating instruments, meteorological instruments and contract work produced by the reticle-making department.

So great was the general public interest, that it was decided to open the exhibit of instruments to all comers for two additional days. Scores of interested Rensselaer Polytechic Institute students visited the exhibit on these days.

The "See-Us-At-Work" Day was held to create a wider dissemination of knowledge regarding Gurley products and of the individual role of the employees.

A booklet was distributed, called "The Gurley Story", and sub-titled, "A Short Story about a Long Career", which outlined in sixteen pages the history of the Gurley company. Illustrated with pictures of Gurley instruments, it gave examples of their applications.

The instrument exhibit, which could be called "A Cavalcade of Surveying and Engineering Instruments", took the visitors through over 100 years of progress in the field of fine instrument making.

• Courses in Modern Labor Problems

In a further attempt to keep the curricula at Lowell Textile Institute in line with the current problems in industry, President Kenneth R. Fox announced the introduction of a course in Modern Labor Problems which will be required of all students at Lowell Textile Institute.

The course will involve the use of a manual of current labor laws which apply in Management-Labor relationships in the United States. Case material will be studied to familiarize the student with Federal and State court actions, with the functions of conciliators and arbitrators. At intervals during the course the class will meet informally with representatives of both Management and Labor, and opportunities will be provided for discussion with the visiting speakers. The chief objective of the course will be the development of familiarity with the techniques of the bargaining table and the problems in drafting, interpreting, and administering the modern labor contract.

Leading up to this course in Modern Labor Problems will be another new course, Industry and Society. In this course, attention will be given to the distribution of wealth, wage theories, poverty, industrial safety and health, employee welfare, social insurance, and unemployment. The background of Modern Labor Problems in the development of American industry will be studied and analyzed in an effort to discover and interpret Labor's persistent and changing demands .

These two courses will lead to a third course which is called Labor Relations Seminar in which it is planned to bring together Management and Labor representatives for round table discussions of modern relations problems. In this latter course, classes will be kept small and thus gain in informality.

These courses will be under the direction of John R. Robertson who came to Lowell Textile Institute from Textron Inc. where he was Training Director in the Division of Industrial Relations. Prior to his experience with Textron, Mr. Robertson had extensive experience in industrial relations work with the Sylvania Electric Products Co. plants in New England. Mr. Robertson received his A.B. degree from Bowdoin College in 1927 and his A.M. degree from Harvard University in 1931. Prior to entering the industrial relations field he had considerable experience in the teaching field.

The welcoming committee at the W. & L. E. Gurley "Open House" being shown several new Gurley glass reticles by Harold R. Larsen, Chief Engineer. Left to right are Charles I. Day, President; Edgar H. Betts, Vice President and Treasurer; William A. Rockefeller, Credit Manager; Robert G. Betts, Specialties Sales Manager; Charles E. Smart, Works Manager; Lester C. Higbee, Sales Manager, and Mr. Larsen. Other instruments shown are a magnetometer assembly, a Gurley transit, level vials, and the transmitter for an electronic anemometer.

"The introduction of these courses", said President Fox, "constitutes another step in the development of a more complete program relating to the human engineering aspects of industrial activity."

• Service Pins Awarded

With a total service of 4,294 years, 220 Grasselli (Linden), N. J. employees of the General Aniline Works Division, General Aniline & Film Corporation, with individual service from 15 to 45 years, received gold service pins at the Third "March of Time" Testimonial dinner on Wednesday, December 10th, at the Elizabeth Carteret Hotel.

Jack Frye, President of the Corporation, presented diamond-studded pins to 24 employees with service of 25 or more years. James M. Cunningham, manager of industrial relations, with 45 years service, had the greatest seniority in the group. Ruby studded pins went to 64 employees with 20 to 25 years of continuous employment. Gold pins were awarded to 132 employees with more than 15 and less than 20 years of service.

More than one thousand workers, employed at the Grasselli plant from 5 to 15 years, have received either bronze or silver pins at the plant this week.

• Joins ITT

Victor B. Shelburne, Jr., a native of Washington, North Carolina, has joined the staff of the Institute of Textile Technology where he will work in the Division of Chemical Engineering. Mr. Shelburne is a graduate of North Carolina State College, holding the degree of Bachelor of Chemical Engineering.

• Joins Kimberly-Clark

Howard A. Mayo, who was formerly associated with the Dan River Mills, Danville, Va., has joined the staff of the Research and Development Laboratories of the Kimberly-Clark Corporation at Neenah, Wis., it has been announced by H. A. Rothchild, Technical Director. Mr. Mayo is a graduate of North Carolina State College, School of Textiles.

• Promotion and Advertising Manager, Merrimac Division

Appointment of Edmund Greene as sales promotion and advertising manager of the Merrimac Division of Monsanto Chemical Company was announced recently by Josiah B. Rutter, Vice-President of the Company and Division General Manager.

A graduate of Harvard University with an A.B. in chemistry, Greene worked for three years on Greater Boston newspapers. He was employed for a year by Smith, Kline & French Laboratories, manufacturers of ethical pharmaceuticals, and for eight years by Rohm & Haas of Philadelphia.

• American Conditioning House Program

Herbert J. Wollner, president of the American Conditioning House, Inc., recently announced an important new addition to the staff of experts employed by the company in its field of wool testing and research. The organization has recently started an intensive investigation looking toward the development of new techniques in the field of laundering wool fabrics and the like. It is the objective of this research program to develop methods by means of which untreated fabrics will not be as prone to shrink during laundering operations. This investigation is quite aside from and unrelated to studies being conducted elsewhere in the field of chemical and resin treatment of wool fiber.

Cecil Fell, formerly Assistant Director of the Textron Laboratory, has been retained as Laboratory Supervisor in this program.

The studies undertaken are initially confining themselves to an observation of techniques as applied to existing laundering equipment, and this work is organized in the closest collaboration with federal and private agencies.

The American Conditioning House, Inc. is continuing its broad program for the industry of sampling and testing raw wool by the core boring procedure and of developing methods by means of which the handling of the wool fiber will be improved upon from an engineering and an economic point of view. Devoting itself entirely to the study of wool to the exclusion of all other fibers, the American Conditioning House, Inc. is extremely optimistic as to the capacity of wool as a fiber to far more than hold its own in the competitive field comprising other natural fibers and synthetic fibers.

• Sulfonated Estols

Commercial production of a new series of sulfonated fatty esters from vegetable sources is announced by E. F. Drew & Co., Inc. The new materials are known as Sulfonated Estols.

A unique combination of oil refining, distillation, hydrogenation and chemical processing makes available sulfonation products which are said to be free from mineral oil, resinous substances, or proteinaceous and pectic impurities.

Sulfonated estols are said to have excellent color and odor properties, and to be exceptionally free from development of odor and color upon aging.

The increased yield of high quality sulfonated esters from vegetable oils is said to make Sulfonated Estols available at prices lower than conventional sulfonated oils or sulfonated tallow.

Sulfonated Estols are available in several grades with properties corresponding to various sulfonated natural oils and sulfonated tallow.

OBITUARY

HARRAL O. PIERCE

HARRAL O. PIERCE, manager of the Charlotte, N. C., branch office of Solvay Sales Division, Allied Chemical & Dye Corporation, died December 28, 1947 of a heart attack following a brief illness. Mr. Pierce joined the Solvay organization in 1910 in the paymaster department of the Solvay Process Company, where he remained until 1915 when he became a partner in Snell and Pierce, jobbers of laundry supplies. This firm was absorbed by Solvay Sales in 1922, Mr. Pierce being named first manager of the Syracuse branch office, continuing in that capacity until 1929 when he was transferred to the New York Executive offices of the firm as a division sales manager. Mr. Pierce became manager of the Charlotte branch office in 1935.

BRICE S. HULL

BRICE S. HULL, Pittsburgh branch manager of Solvay Sales Division, Allied Chemical & Dye Corporation, died suddenly of a heart attack on January 2, 1948. Mr. Hull, born in Van Wert, Ohio, was graduated from Ohio State University in 1914 with the degree of Bachelor of Science in Chemical Engineering, later completing graduate work there and at the University of Pittsburgh. He did technical service work for the Drackett Company until 1922, when he joined Wing & Evans in Cincinnati in a similar capacity. In 1923 Mr. Hull became Pittsburgh branch manager for Wing & Evans, remaining in that position when the firm was absorbed by Solvay Sales in 1927.

• World Chemical Developments

World Chemical Developments, 1940-46, Part I, covering chemical developments in most of the countries of Europe and the British Commonwealth, has just been published by the Office of International Trade, U. S. Department of Commerce.

This booklet resumes the series of annual reviews of chemical developments throughout the world which was issued from 1933 to 1939 and discontinued during the war.

The war and postwar reconstruction programs have led to many developments in the chemical industries which are reported in the present booklet. Difficulty in obtaining information from some areas still suffering from the effects of war made it advisable to issue the material in two parts instead of postponing publication until all countries could be covered in one volume, OIT said.

Part II, cntaining information on chemical developments in countries nct included in Part I will be issued within a few months.

The present booklet is available from the Superintendent of Documents, Washington 25, D. C., for thirty cents.

• Annual Meeting, SOCMA

The twenty-sixth annual meeting of the Synthetic Organic Chemical Manufacturers Association was held on Wednesday, December 10th, at the Commodore Hotel, New York. Reports were given by various officers and committee chairmen. There are now a total of 85 member firms, 10 having joined during 1947. The following officers for 1948 were elected:

President—Ralph E. Dorland, Dow Chemical Company.

1st Vice-President—Elvin H. Killheffer, E. I. du Pont de Nemours & Co., Inc.

2nd Vice-President—Eric C. Kunz, Givaudan-Delawanna, Inc.

Treasurer — C. M. Richter, Pharma Chemical Corp.

New Board Members—Herbert W. Smith, Carbide & Carbon Chemicals Corp. and Thomas H. Roberts, Arnold, Hoffman & Company.

A resolution was presented and adopted making Dr. August Merz, past president, an honorary member of the Board of Governors.

Following the meeting were a social hour and dinner. The speaker of the evening was Wm. Henry Chamberlin who spoke on "The Russian Challenge". There was also a program of musical numbers.

←Among those present at Annual Meeting of SOCMA

CALCO dyelines

PUBLISHED BY CALCO CHEMICAL DIVISION, AMERICAN CYANAMID COMPANY
Bound Brook, New Jersey
New York • Chicago • Boston • Philadelphia • Charlotte • Providence

NEW WOOL DYES WITH IMPROVED FASTNESS

The increasing demand for shades of better fastness to light and washing on certain types of wool materials has resulted in the development of a process for the application of the complete line of Calco Indigoid and Anthraquinone Vat Dyes to these materials. Vat-dyed shades can be produced which exhibit extraordinary fastness to light, even in pale shades, as well as excellent fastness to washing, perspiration, salt water, cross dyeing, fulling, etc. Such shades are of particular interest to manufacturers of automotive upholstery fabrics, knitting yarns, carpet yarns and blankets. Lack of brightness had been a handicap in some cases; and where acid, chrome and metallized wool dyes were used, they provided inadequate light and wash fastness.

Desirable Physical Properties Retained

The practicality of this process of applying vat dyes to wool has been proved during the routine dyeing of thousands of pounds of material. The desirable physical characteristics of the wool are well preserved. For example, wool slubbing dyed by this process has a softer, more lofty feel, better spinning qualities, and more tensile strength than the same material which has been dyed by the usual methods.

At the present time vat dyes can be applied to wool in the form of stock slubbing, tops and yarn. Piece goods cannot be dyed due to lack of suitable equipment for the mechanical handling of the cloth without tension and in the open width.

The cost of vat-dyeing of wool is higher than that of ordinary wool dyeing procedures, but the advantages more than offset the extra costs.

Practically all Calco vat dyes can be applied to wool by various recommended methods, but those especially adaptable because they produce shades of better than average fastness to light include:

*Calcoloid† Yellow GCD Paste
*Calcosol† Yellow G Double Paste
*Calcoloid Golden Orange GD Paste
*Calcoloid Golden Orange RRTD Paste
Calcoloid Flaming Orange 2R Paste
*Calcoloid Orange RD Paste
Calcosol Scarlet B 100% Powder
*Calcoloid Pink FFD Paste
Calcosol Pink FB Double Powder
*Calcosol Red BN Double Paste
Calcoloid Violet 6RD Paste
*Calcoloid Blue BLD Double Paste
*Calcosol Blue GCD Double Paste
Calcosol Blue 2BD Powder
*Calcosol Blue 3G Paste
Calcosol Navy Blue Paste
*Calcosol Jade Green N Double Paste
Calcosol Olive Green BN Double Paste
*Calcosol Brown R Paste
Calcosol Brown RRD Paste
*Calcosol Copper Brown Paste
*Calcosol Gray 2G Double Paste
*Calcoloid Black BBD Double Paste

*Powder type also available †Trade-mark

The process for applying vat dyes to wool is simple and easy to carry out, the dyeing time is short, and steam consumption is low. Either the pigment method or the reduced method can be used. A protective agent for the wool is usually employed, and for this purpose the ligno-sulfonates, by-products of the paper industry, are suitable. Caustic soda or trisodium phosphate is used as the alkali.

Typical of commercial procedure is the dyeing of wool slubbing in top form which is carried out on various forms of top dyeing machines or on perforated spools in machines of the Abbot type.

Calco has worked out procedures and formulae to be followed for achieving best results in dyeing various types of wools. These are applicable to stock and package dyeing, with only the slight change in procedure required by the specific types of machines. Full information is available on request.

A New Cotton Dye

CALCOLOID COPPER BROWN DOUBLE POWDER

Calco has now developed a dispersible powder, double strength, in the new Copper Brown shade which it introduced some months ago as a paste. This type is especially desirable for use in mills preferring a powder type to prevent drying out in the drug room. It also facilitates the weighing out of small quantities.

Calcoloid Copper Brown Double Powder is recommended for package dyeing either by the reduced method or pigment method when dyed at 140° F. or slightly lower. It possesses excellent working properties on cotton, dyes well on yarn, raw stock, piece goods and package machine. Light shades will stand 40 hours' Fadeometer exposure. It also gives good fastness to light, washing and bleaching. It imparts very good light fastness to wool tops and slubbing, and it is suitable as a shading element for automotive shades.

FOR THE TEXTILE BOOKSHELF

Studies of Wool Dyeing (Calco Technical Bulletin No. 794) explains in detail the Calcomet process and discusses various methods for applying chrome colors. The Calcomet method has many advantages over other methods in producing better fiber levelness.

"They've tried everything—but I think that trick'll get 'em a new car hands down!"

There is a growing demand for fabrics with

A WATER REPELLENT FINISH

You can meet this demand while still maintaining the most delicate shades and without affecting the "feel" of the materials treated if you specify Commonwealth's effective water repellent finish—

Hydropel

Your mill will appreciate the fact that Hydropel is an emulsion type compound that is easy to apply in one bath.

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Ten ways to use the Gurley Permeometer*

Here's the versatile instrument for quickly and accurately measuring air permeability of fabrics which permit passage of from 1 to 400 cubic feet of air per square foot area at a pressure drop of 0.5" of water. Write for Bulletin No. 1600. W. & L. E. Gurley, 512 Fulton, Troy, N. Y.

GURLEY
Scientific Instrument Makers Since 1845

*Conforms to ASTM "Tent. Meth. of Testing for Air Permeability of Text. Fabrics" D737-43T.

Use the Gurley Permeometer for measuring:

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2. *Quality* of filter cloth.
3. *Use requirement* of cloth intended to resist or pass air.
4. *Water-resistant* properties.
5. *Coolness* or *warmth* of clothing material.
6. *Construction* of cloth.
7. *Penetration* into cloth of various coatings.
8. *Retention of fillers, starch and sizing* in cloth after laundering or cleaning.
9. *Compactness, nap* or *fiber arrangement* in cloth after fulling, washing, sizing or other treatments.
10. *Amount of wear* after abrasion tests.

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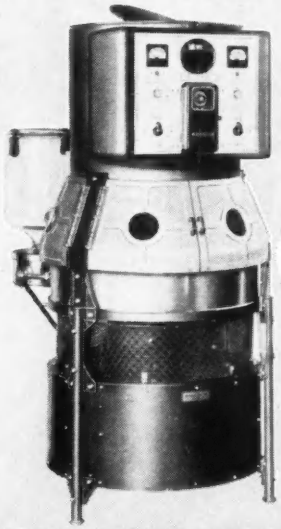
for accelerated color fading



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Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature automatically controlled. No loss of light intensity of arc during life of machine.

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Laboratory and mill-tested Laurel Triconates have won favor with leading hosiery mills and processors because of their high efficiency and economy. Send today for sample and recommendations for use.

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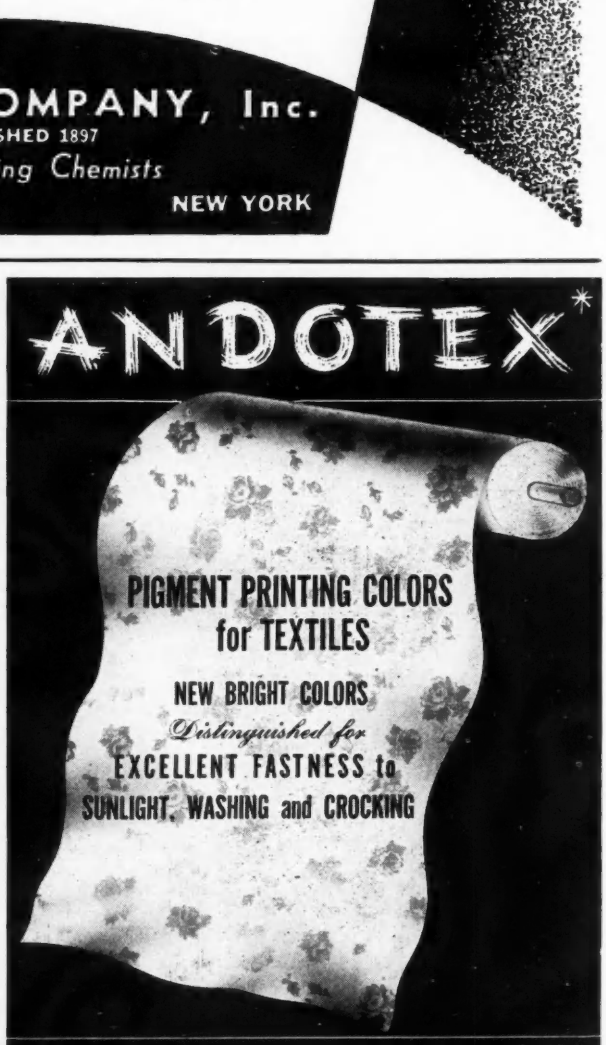

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American Dyestuff Reporter

TECHNICAL SALES REPRESENTATIVE: Wanted by well-established sizing specialists to help develop line of textile auxiliaries and finishes. Require: young man, at least 5 to 10 years' experience in wet processing and finishing, good sales personality. Good salary for right man, excellent future. Southeast. Write Box 344.

WANTED CHEMIST: Experienced in bleaching, dyeing, printing and finishing cotton goods, to take charge of laboratory and quality control. Location—New England. Write Box 369.

POSITION WANTED: Cotton and rayon piece goods finishing control chemist with 23 years' experience. College graduate, able to assume charge of laboratory. Prefer location north of Virginia along seaboard. Write Box 349.

WANTED SALES-TECHNICIAN to represent well established manufacturer of chemical specialty for textile finishing mills. Should be capable of demonstrating, selling and providing technical service after suitable training. Submit, in confidence, details as to age, education, experience and salary. Write Box 370.

WANTED — MANAGER

Industry—Wool Scouring and Carbonizing

Location—Eastern part of Pennsylvania

Qualifications—Capable of managing small plant in all phases of management. Experience in textile field desirable but not required.

Salary—Open—Depends on individual.

EXCELLENT OPPORTUNITY

Write stating complete information as to experience, education, salaries received, age, etc.

Write Box No. 383

WANTED: Man with a few years experience selling fungicides. Please state technical education. Headquarters with progressive independent company in New York.

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you have a large number of accounts requiring quality products

you are interested in a liberal drawing and commission arrangement

you want to represent a reputable firm with unsurpassed production facilities

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CARLSTADT **NEW JERSEY**

WANTED: Southern Representative to sell outstanding line of detergents, finishes and gums. Unlimited earning possibilities. Understanding co-operation. State experience and acquaintanceship in first letter to be held in confidence. Write Box No. 384.

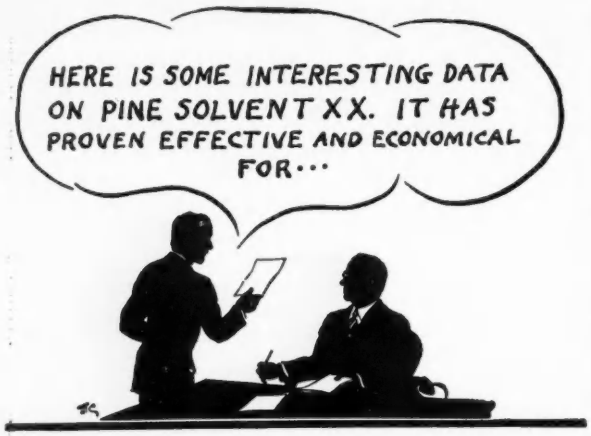
Technical man wanted for sales and demonstration work in New England. Experience in textile printing and finishing desirable. Excellent opportunity with large chemical manufacturers. State age, experience and education. Write Box No. 385.

WANTED: Assistant dyer for large New England plant. Experienced in spun rayon and mixture fabrics. Must be willing to take 3rd shift work. Write Box 386 giving qualifications, experience and salary requirements.

Position Wanted: TEXTILE RESEARCH DIRECTOR: Successful work on textile finishes, dimensional stabilization of textiles, surface-active agents and textile auxiliaries. Numerous publications. Many years of plant, laboratory and promotional experience. Available on or before March 31st. Write Box No. 388.

POSITION WANTED: TEXTILE CHEMIST: Wide knowledge and experience in manufacture and application of surface-active agents and textile auxiliaries. Interested in opportunity to manufacture such chemicals on partnership basis with someone having manufacturing facilities and sales connections.

Write Box No. 389



COTTON: In the kier, Pine Solvent XX brings the liquor in contact with every fiber, leaves uniform bottoms that dye and finish more evenly. Boiling time is cut. Fibers are softer, fuller, more resistant to age-discoloration.

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PRINTING: In printing paste, Pine Solvent XX wets pigments thoroughly, disperses them evenly, and holds them in suspension without agglomeration until the design is on the fabric. Designs are sharp, colors bright and clear, no specks are formed.

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Burk-Schier Pine Solvent XX Reduces Surface and Interfacial Tensions . . . Wets, Penetrates, Suspends, Disperses . . . Aids Detergents and Dyes. A Little Does a Lot and Does It Well.

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• INDEX TO ADVERTISERS •

Aktivin Div., The (Heyden Chem. Corp.)	
Alco Oil & Chem. Corp.	
Althouse Chemical Co.	Second Cover
Amalgamated Chemical Corp.	
American Aniline Products, Inc.	XIII
American Cyanamid Co. (Ind. Chem. Div.)	Back Cover
American Dyewood Company	
American Key Products, Inc.	
Anders Chemical Corp.	XXVIII
Arkansas Company, Inc.	IV
Armour and Co.	
Arnold, Hoffman & Co., Inc.	
Atlantic Chemical Co., Inc.	VII
Atlas Electric Devices Co.	XXVII
Barry Chemical Co.	XXIV
Becco Sales Corp.	XXXI
Bick & Co., Inc.	XXVI
Blickman, Inc., S.	
Burkart-Schier Chemical Co.	XXX
Butterworth Sons Co., H. W.	XXXII
Calco Chemical Division American Cyanamid Co.	XXIII
Calgon, Inc.	
Campbell & Co., Inc., John	VI
Carbic Color & Chemical Co., Inc.	XX
Carbide & Carbon Chemicals Corp	
Ciba Company, Inc.	
Coaltar Chemicals Corp.	XXVIII
Colgate-Palmolive-Peet Co.	
Commonwealth Color & Chemical Co.	XXIV
Drew & Co., E. F.	
Du Pont de Nemours & Co., E. I.	
Dyestuff Division	Front Cover
Fine Chemicals Division	
Emery Industries, Inc.	
Fancourt & Co., W. F.	XXV
Geigy Company, Inc.	
General Chemical Company	
General Dyestuff Corp.	
Girdler Corp., The	
Grinnell Co., Inc.	
Gurley, W. & L. E.	XXVI
Hardesty Co., W. C.	
Hart Products Corp.	
Heyden Chemical Corp.	
Hooker Electrochemical Co.	VIII
Interchemical Corp., Textile Colors Div.	
International Salt Co., Inc.	XVI
Kali Manufacturing Co.	
Kelco Co.	
Laurel Soap Mfg. Co., Inc.	XXVII
Leatex Chemical Co.	
Leeds & Northrup Co.	
Maher Color & Chemical Co.	
Mathieson Alkali Works, Inc.	
Maywood Chemical Works	
Monsanto Chemical Co.	X, XI
Myles Salt Co., Ltd.	
National Aniline Division, Allied Chemical & Dye Corp.	
National Adhesives	XV
National Carbon Co., Inc.	
Nopco Chemical Co.	
Nova Chemical Corp.	
Nuodex Products Co., Inc.	
Nyanza Color & Chemical Co.	
Onyx Oil & Chemical Co.	XVII
Oronite Chemical Co.	
Pabst Sales Company	
Perkins & Sons, Inc., B. F.	
Philadelphia Quartz Co.	
Procter & Gamble	
Proctor & Schwartz, Inc.	
Protean Chemical Corp.	
Refined Products Corp.	V
Richmond Oil Soap & Chemical Co., Inc.	XXIV, XXVI
Riggs & Lombard, Inc.	
Rohm & Haas Company	
Rona & Co., Inc., L. L.	XXVII
Royce Chemical Co.	
Rumford Chemical Works	XIX
Sandoz Chemical Works, Inc.	
Scholler Bros., Inc.	Third Cover
Sharples Chemicals Inc.	
Sindar Corp.	
Smith, Drum & Co.	
Solvay Sales Div., Allied Chemical & Dye Corp.	XXII
Sonneborn Sons, Inc., L.	
Standard Brands, Inc.	
Standard Chemical Products, Inc.	
Stein Hall & Co., Inc.	
Tennessee Eastman Corp.	III
Titan Chemical Products, Inc.	
Union Carbide & Carbon Corp.	
United Chemical Prod. Corp.	
U. S. Stoneware	XII
Vanderbilt Co., Inc., R. T.	XVIII
Van Vlaanderen Machine Co.	IX
Virginia Smelting Co.	
Wallerstein Co., Inc.	
Warwick Chemical Co.	
Watson-Park Company	XIV
Wolf & Co., Jacques	
Young Co., J. S.	
Young Aniline Works	
Zinsser & Co., Inc.	XXVIII
Zurn Co., O. F.	

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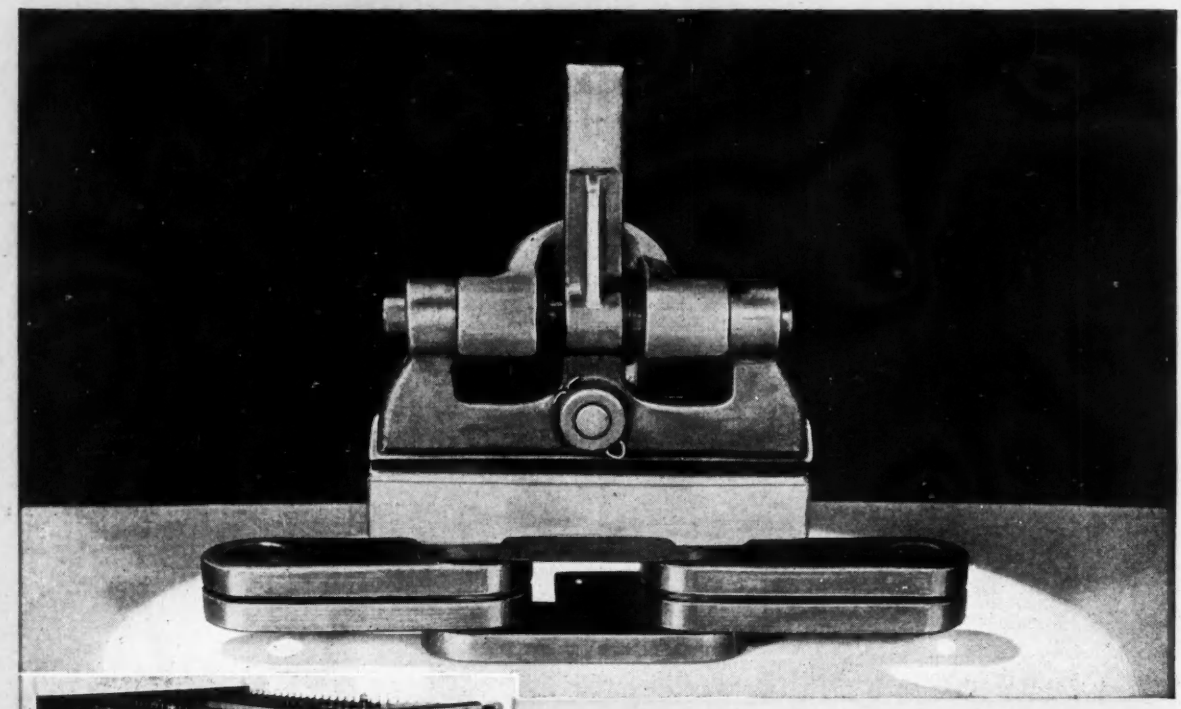

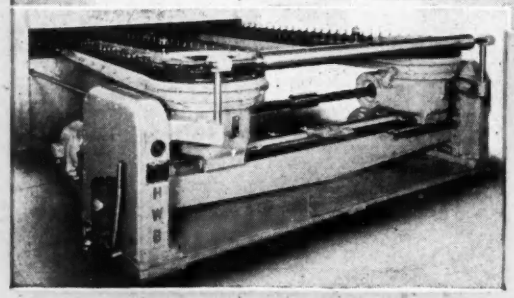

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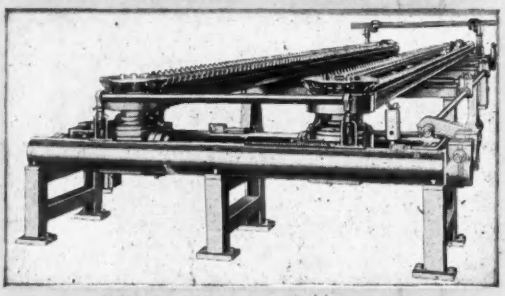
New "43" Chain Ends Tenter Slow-Downs



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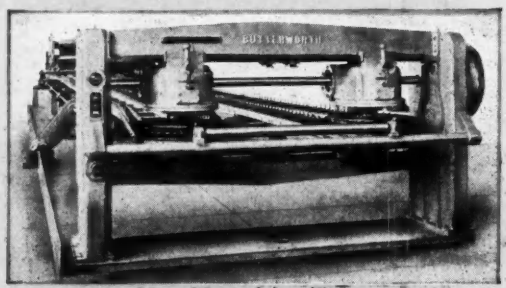

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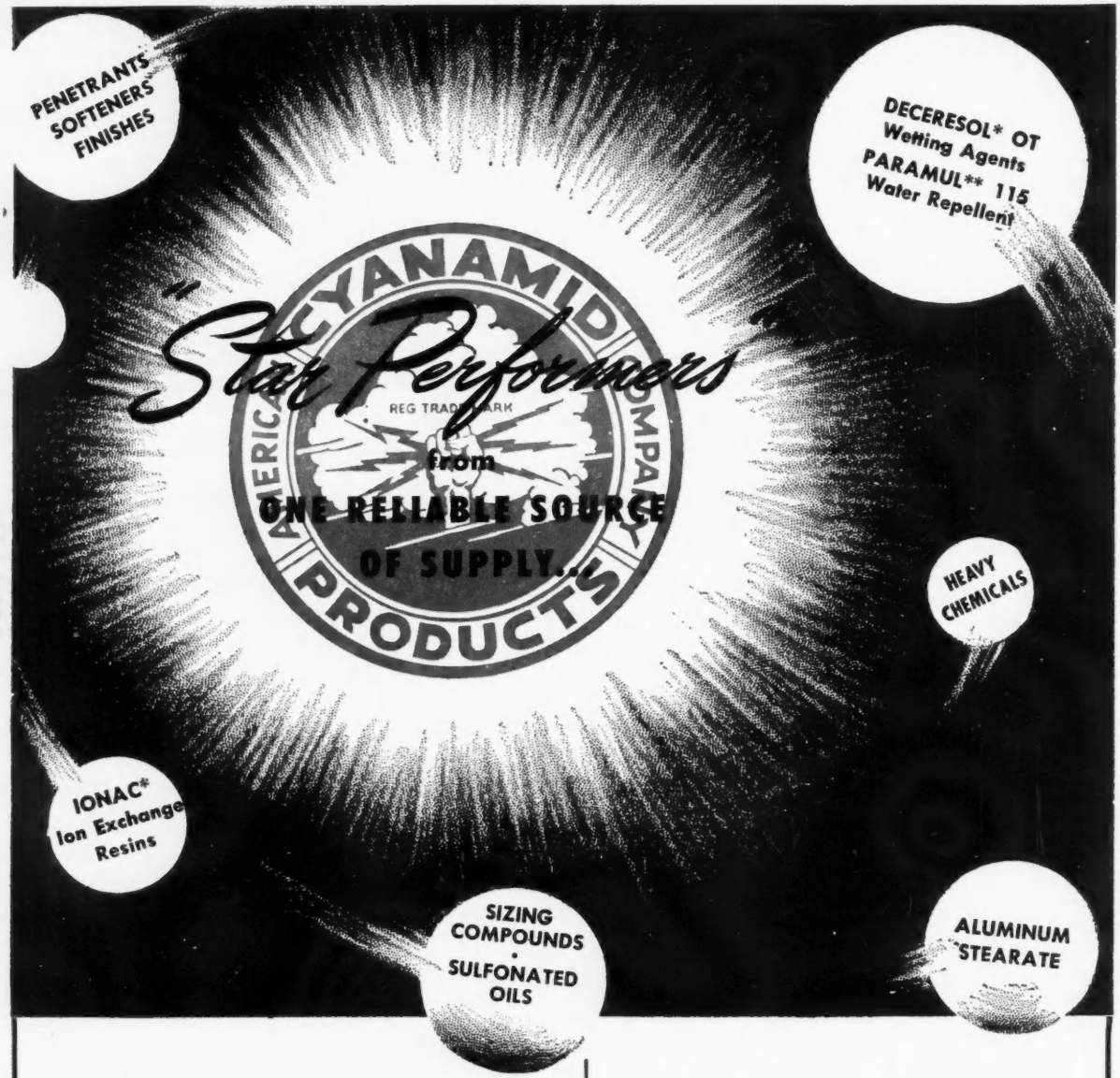

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